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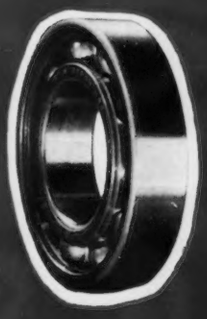
NOVEMBER 19, 1942

The IRON AGE



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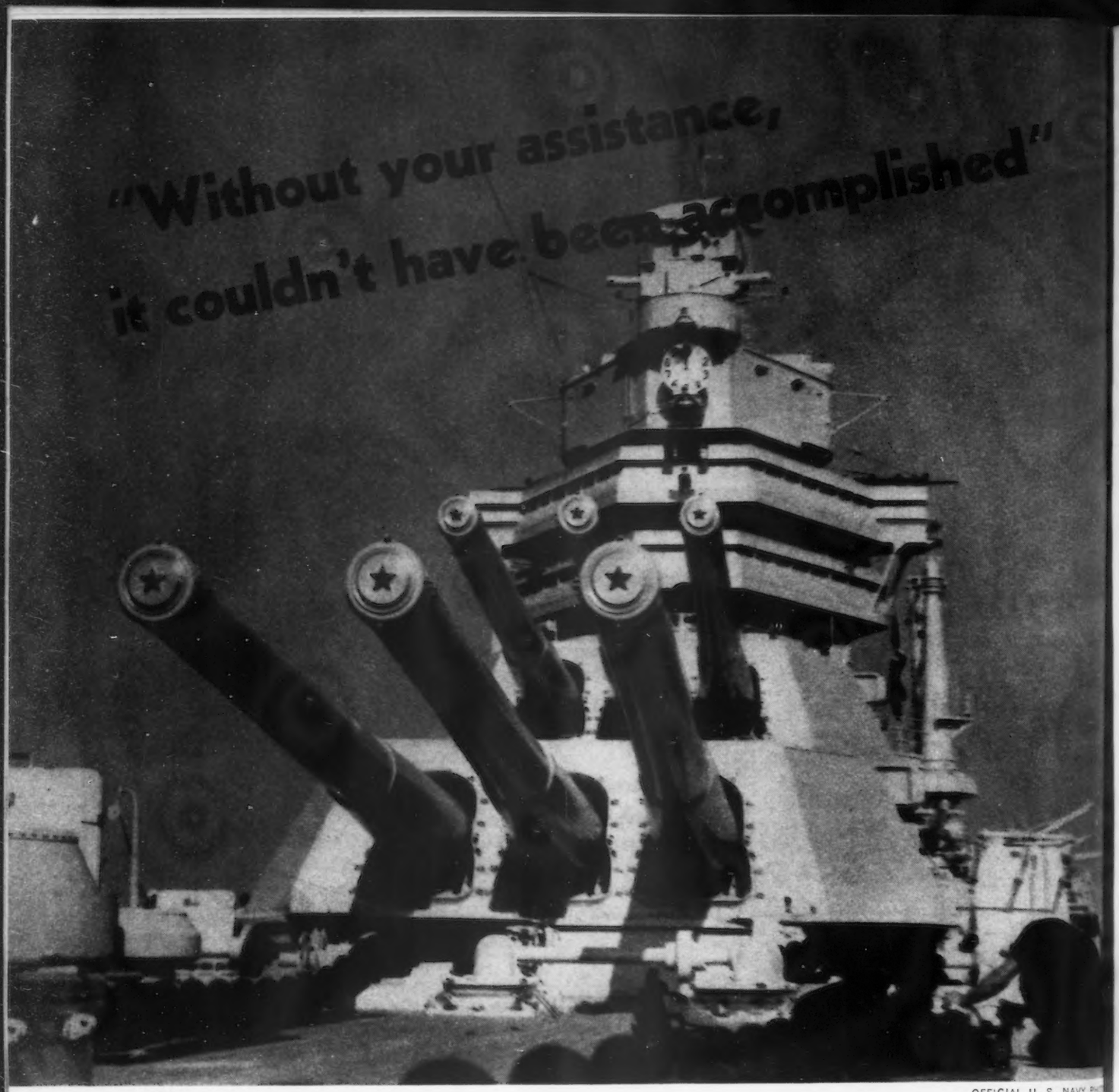

OFFICIAL U. S. NAVY PHO

Record-breaking service on an important Navy order, made possible by Ryerson cooperation on steel! "Without your assistance, it could not have been accomplished," writes the contractor—and again Ryerson teamwork scores.

Cases like this—in which quick Ryerson steel-service has speeded up war production—run into the thousands! While we have not kept count, enough Ryerson customers are working on war contracts to firmly establish Ryerson steel from stock as a vital part of the war production machine.

Hundreds of plants on war contracts are *depending* on Ryerson for steel. An important order here, too urgent to wait on mill production; a few bars there; some strip or a few sheets somewhere else. It multiplies into tremendous tonnage—all labeled "RUSH"—and it's all going into tanks, planes, guns and ships to beat the Axis!

It is a source of pride to the Ryerson organization that its One Hundredth Year finds it on the direct line of greatest service in the war production program—There is a great deal of satisfaction in a War Production Unit report: "Without your assistance it could not have been accomplished."

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RYERSON STEEL-SERVICE

THE IRON AGE

NOVEMBER 19, 1942

ESTABLISHED 1855

More Flies With Honey

IT is an old axiom that you can catch more flies with honey than you can with vinegar. It is also true, thank God, that with Americans, you can get farther and go faster by persuasive salesmanship than you can by threat.

The average American "gets his back up" when somebody threatens him with dire consequences if he does not do this or that. Thank God again that the average American has this rigidity of vertabrae, because that is the quality that we need to win the war.

Another thing that we are going to need to win the war is to get out the dormant industrial scrap from the various and varied manufacturing plants in this country. And to get that will require salesmanship too.

Threats won't do it. On the contrary, the threat to owners and managers of industrial equipment to come into their plants and seize machinery for scrap will, in my opinion, insure the failure of such a drive. Certainly persuasive selling should be exhausted before such tactics are even mentioned.

We have, for example a news item from Buffalo which reads as follows:

"Buffalo, November 9—Four hundred Buffalo industrialists have been warned by R. Merrill Decker of New York, regional chief of the WPB industrial salvage section for New York and New Jersey that failure to undertake an immediate and thorough housecleaning of scrap in Niagara Frontier plants might lead the government to make the action compulsory instead of voluntary."

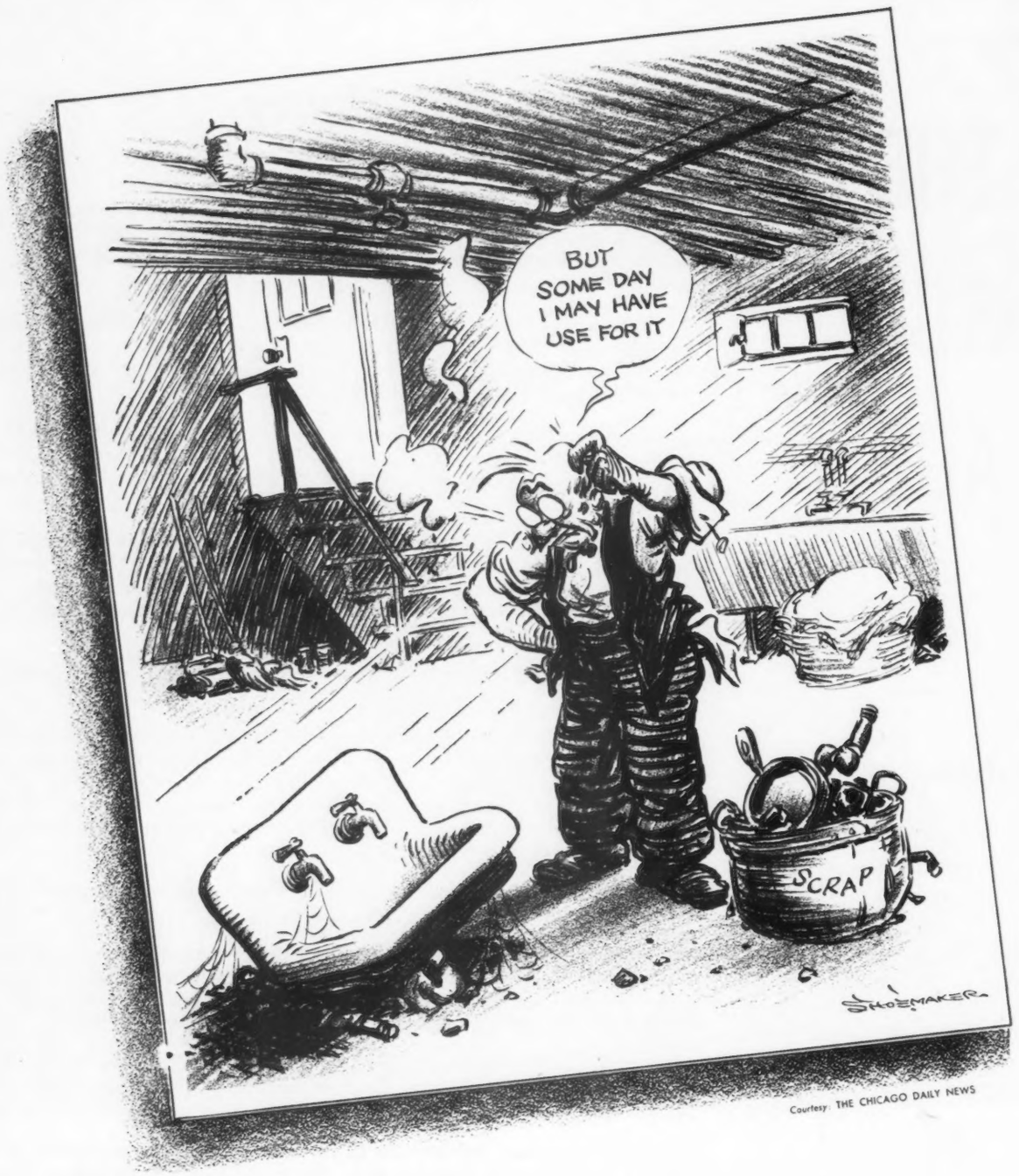
This is the same threat that the gentlemen mentioned had previously made to industrialists in New York City.

It seems to me that it is particularly unfortunate to attempt to launch a selling campaign under such an unfavorable introduction. Especially since the services of salesmen who have volunteered to assist in this industrial scrap salvage campaign have not yet been utilized.

It is bad selling to build up sales resistance before your salesman is sent to call on the customer. To threaten the customer, in other words, that he had better buy your goods or else!

And when such salesmen call as accredited representatives of the agency making such threats, they are more likely to be regarded as "spotters" whose job is to pave the way for conscription than as emissaries of goodwill.

To be fair about it, I must say that this situation apparently does not apply in other sections of the country, where volunteer salesmen are already at work and where the district WPB salvage representatives have not substituted vinegar for honey.



Courtesy: THE CHICAGO DAILY NEWS

If we lose, that day will never come

WE ARE known as a nation of thrifty "string-savers." Around our industrial plants are hoards of obsolete and obsolescing machinery and equipment, saved because "some day we might have use for it."

Today there *is* use for it, as desperately needed scrap, to make steel so that our fighting men will have the guns and tanks and ships they need. There will never be a better time to clear our plants of miscellaneous machines, old boilers, unused structures, unfinished parts, etc. Never will it be needed more.

Someone must be given the responsibility to decide what can be discarded throughout the entire plant, *and see that everything possible is scrapped.* Instead of saying, "But some day I may have use for it," let's remember that, If we lose, that day will never come!

INLAND STEEL CO.

38 South Dearborn Street, Chicago, Illinois

BORON—

By T. W. LIPPERT
Managing Editor, The Iron Age

. . . After 130 years of obscurity, Davy's 26th element is being groomed for top billing, equal with such favorite and conventional steel alloying elements as manganese, chromium, nickel, molybdenum, vanadium and silicon. Boron is plenty potent metallurgically, and this new and readily available domestic steel alloying agent will likely dominate much of the coming year's furbishing of NE steels. So far, however, Boron has been bedevilled by an atmosphere of mystery, its role beclouded by use of such elegant terms as 'intesifier", "vitamin" or "needling alloy", and its utilization confused by sub-surface technical and commercial polemics.

AS if he doesn't already have enough to fret about, the harried ferrous metallurgist is soon going to have to freshen up on his nodding college acquaintanceship with the non-metallic element Boron. The chemists assign to it the symbol B; the long-haired physicists have doped out its atomic weight as 11.0, its specific gravity as 2.6, and its melting point around 4000 deg. F.; and the man in the street has had occasional encounters with Boron in the market place in the form of boracic acid, borax and boracite.

Boron is characterized by an astonishingly high affinity for oxygen and is, therefore, naturally a superb deoxidizer. Not so long ago the copper industry first utilized Boron's overpowering passion for oxygen, nitrogen and oxygen-containing gases to obtain castings of mechanical soundness and high electrical conductivity previously unobtainable. But, until very recently, all efforts to fit Boron into the framework of ferrous metallurgy have been, say, uninspiring. Now, all evidence promises an important war and post-war role for Boron as a steel alloying element. It is a readily obtainable domestic element, and over the next year should relieve somewhat the tremendous pressure on certain of the other elements, particularly molybdenum.

Much, if not all, of the early work on the effect of Boron in steel involved the use of such extremely large percentages of Boron, as judged by present standards, that little attention need be given it. Guillet in 1907 published the results obtained with a steel containing 0.46 per cent Boron. Whitney in 1910 patented an electrical steel containing 0.2 to 5.0 per cent of Boron. In 1914 *Stahl und Eisen* published the results of tests conducted on steels containing 0.20, 0.40, and 0.80 per cent Boron. The Bureau of Standards published, in 1922, the results obtained with a number of steels containing from 0.06 to 0.57 per cent Boron. De Golyer in 1924 patented a chromium steel containing "appreciable amounts" (which he describes as "about 0.25 per cent") to 15 per cent Boron. All these stabs into the unknown were generally unsatisfactory and led to no commercial development. The situation seems to be fairly described by Walter in his patent of 1924 (U. S. Patent No. 1,519,388) in which he says:

"Many attempts have been made to improve iron and steel and their alloys by adding Boron thereto, but the results so far were not encouraging for the reason that the amount of Boron used, generally from 0.2 to 2.0 per cent is altogether too high and renders the product hard and brittle and of late the experiments with Boron in this connection have been practically abandoned."

He then proceeds to show that "even such a minute amount as 0.001 per cent of Boron" has a marked effect on the properties of steel and in his claims he covers steels containing Boron within the limits of 0.001 and 0.1 per cent.

It certainly appears that Walter was perhaps the first to appreciate the fact that extremely small percentages of Boron were effective in improving some of the properties of steel and that the amounts previously used were far in excess of those necessary and resulted in making the steel brittle (and hot short), but, he apparently did not appreciate the effect of Boron on the "hardenability" of steel, and it is this effect with which the industry is most concerned today.

As herein used, "hardenability" refers to that characteristic of a plain carbon or low alloy steel which determines the depth to which it will harden when quenched. It does not refer broadly to the well known property of a steel to harden when cooled rapidly, as by quenching in water or oil, from above the upper critical temperature, nor does it refer to the intensity of hardness or the maximum hardness that may be obtained. There are, of course, steels such as the austenitic and ferritic stainless steels which will not harden at all on quenching, but these are not considered in this discussion which is limited to what are commonly known as the heat treated engineering steels.

The maximum hardness that can be obtained in a heat treatable plain carbon or low alloy steel is depen-

dent almost entirely on its carbon content. Alloying elements have a minor effect, but in an alloy steel containing less than 5 per cent of alloys, the effect on the maximum obtainable hardness is not significant. Alloys would thus seem to be of little value in increasing the surface hardness of heat treatable steels as the maximum hardness that can be obtained is practically independent of the alloy content and is determined almost entirely by the carbon content and the rate of cooling. The rate of cooling necessary to harden a plain carbon steel is, however, such that this rate is reached for only a relatively small distance in from the quenched surface and so the steel is hardened for only this distance. When the section is quite small and the quench is drastic, the steel may be hardened substantially throughout. However, when the section is relatively large, the interior which cooled at a rate lower than that required to obtain full hardness is left comparatively soft. Such a steel is a shallow hardening steel.

Broadly speaking, the strength of any steel varies directly as its hardness so that a shallow hardening steel would, in large sections, have only a comparatively narrow high strength zone on the outside and a relatively large low strength zone in the interior. The average strength would thus be low as compared to a steel having a wider or deeper zone of high hardness and strength.

Alloys, by lowering the rate of cooling necessary to harden a steel, widen the zone that cools rapidly enough to harden. As a result, sections which would be hardened for only a short distance from the surface if made of plain carbon steel, and be correspondingly weak are hardened and strengthened throughout, or at least to a greater depth, and the piece as a whole is correspondingly stronger if made of an alloy steel. The depth to which a steel will harden, either fully or to some specified hardness, when quenched is a measure of its hardenability, and this can be determined readily in a number of ways.

Minute Percentages Used

It will help greatly if in this study of the effect of Boron in steel the reader forget for the moment the atmosphere of mystery which has surrounded the discussion of this subject and consider it simply another alloying element rather than as an "intensifier," "vitamin" or "needling alloy." Insofar as the effect on hardenability is concerned, and this is the effect of current concern, Boron gives results which are in every way similar to those obtained with the more conventional alloying elements, such as manganese, chromium, nickel, molybdenum, vanadium and silicon. It differs, however, from these alloying elements in that only relatively very minute percentages of Boron are necessary to obtain the desired effect and that an excess over and above what would be considered an extremely small percentage of the common alloying elements may result in a hot short steel.

Already quite a few special commercial Boron-containing alloys are or will be available for adding to steel, as, for instance, Silcaz, Grainal, Bortam and Ferro-boron[1]. These addition alloys have likewise been called intensifiers, special deoxidizers, and a variety of less elegant names, all of which tend to becloud the major constituent and function. Each of the alloys contains Boron, and the prime purpose of each is to introduce Boron into steel. Boron is simply another alloying element similar in kind to manganese, chromium, silicon, nickel, vanadium and molybdenum, although different in degree in that approximately 1/100 of the amount of Boron has the same general effect on hardenability as several of the alloying elements just listed. (This is not too strange, as for the same per cent of alloying element there will be approximately twenty times as many Boron atoms added as molybdenum atoms.)

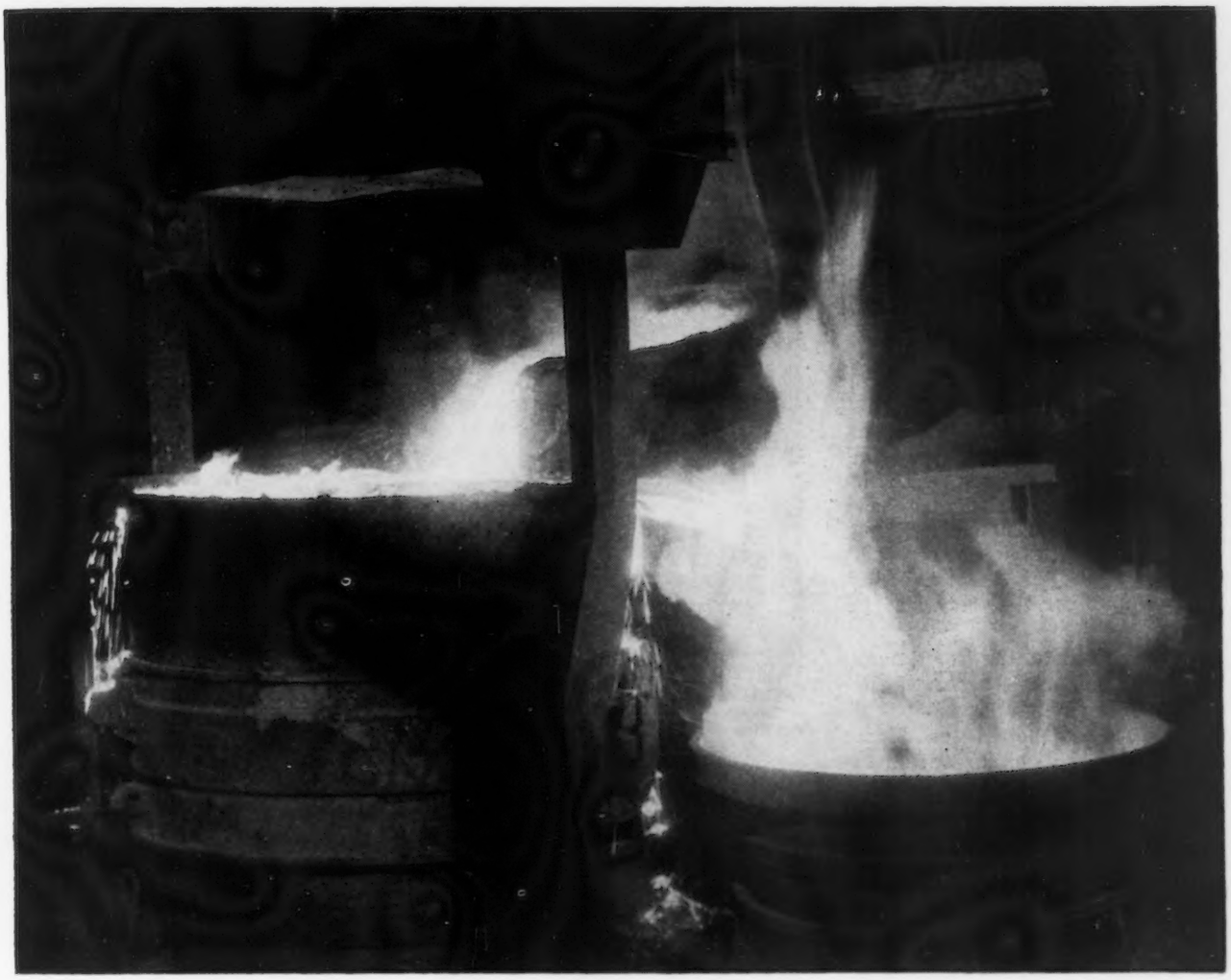
[1] *Extensive publicity on Grainal (Vanadium Corp. of America) several years ago made no mention of the Boron constituent; see* THE IRON AGE, *May 23, 1940, p. 70, also* Metals and Alloys, *June, 1940. Bortam is sold by Titanium Alloy Mfg. Co. Silcaz is a product of Electro-Metallurgical Co. Ferro-boron is sold by both Molybdenum Corp. of America and Electro-Metallurgical Corp. Other companies have or may soon announce competitive special alloying agents as for instance a recent B-Si alloy of Ohio Ferro-Alloys Corp.*

The major function of any alloying element is to provide hardenability. The effect of Boron when present in the form in which it can act, presumably in solid solution in the steel, is limited by the amount which can be held effectively, and the disastrous effect of excess Boron on hot ductility. Some 0.002 per cent Boron, seems to be the optimum effective amount, and more than 0.003 per cent invites trouble in hot working. With this narrow range of permissible Boron content, it has been necessary to use special agents to make effective additions. When effective additions are made and at least 0.001 per cent effective Boron is present, the Boron acts similarly to any other alloy as far as hardenability is concerned. To those familiar with Grossmann factors[2], it is of interest that 0.002 per cent added Boron is equivalent to a hardenability factor of approximately 1.75 per cent. To those not familiar with Grossmann factors, this may be more simply stated that 0.002 per cent added Boron is equivalent to 0.35 per cent chromium or 0.25 per cent molybdenum. In line with the concept of marginal effects, if the given steel contains more than such amounts of chromium or molybdenum, a Boron addition may be used to save even greater amounts of one or more of these elements than the above cited figures. For example: If a steel contains 0.40 per cent molybdenum, the molybdenum content may be reduced to 0.10 per cent by the Boron addition without change in hardenability.

[2] *See article by Grossmann and Asinow,* THE IRON AGE, *April 25, p. 25, and May 2, p. 39, 1940.*

The importance of hardenability cannot be over-emphasized. Not only does it result in higher strength in steels of critical section, but it results in greater toughness after tempering, probably by virtue of producing a more uniform microstructure on quench. This is particularly evident in steels tempered in the lower tempering temperatures or steels subjected to particularly severe impact conditions. While hardenability is the major reason for alloy additions, including the alloy Boron, secondary effects are frequently important. Boron appears to act similarly to molybdenum, vanadium, nickel and copper in preventing ferrite separation on tempering, and this likewise gives increased toughness.

While there are no direct data on the effect of Boron on temper brittleness, experience indicates that it acts similarly to molybdenum in this connection. And, while there are no large scale data on machinability, experience also indicates the equivalent or slightly better machinability for Boron-bearing fine-grain steels as compared to



similar fine-grain steels of equal hardenability, but not containing Boron. There is nothing to indicate that Boron provides creep resistance, although the data are lacking. Again in line with the hypothesis that Boron must be in solid solution to be effective on hardenability, the effect on steels with 60 and more points of carbon is somewhat diminished, probably due to stable Boron carbide formation. Still again, the effect of Boron in the lower carbon carburizing steels, while predictable, appears to be much greater than desired, so that for the time being Boron is recommended for use in steels containing between 20 and 60 points of carbon. Likewise, as true of most alloy steels, maximum effect is achieved in the quench and tempered state and Boron is just like any other alloy addition in that it is effective in normalized steels only when the other chemistry and mass is such that the rate of cooling on normalizing is critical. Most experience with Boron is with wrought steels, but work on cast steels indicates that it is similarly effective but probably to a somewhat lesser degree.

As little as 0.0006 per cent Boron has definite favorable results on hardenability. The Boron is added in the ladle and no little skill is required to assure good dissemination throughout the heat of steel.

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For Boron to be effective it is essential that it be added to the steel in such a way that it is substantially protected from oxidization or other chemical combination and that it be uniformly distributed throughout the molten metal. Silcaz, just to single out one of the commercial compounds, has been designed for this express purpose. It is a balanced alloy in which other elements generally listed as strong deoxidizers are present in graded amounts to protect the Boron without giving undesirable inclusion formation and to provide the extra "killing" action essential for good Boron effect. This extra "killing" action also results in fine grain and experience indicates that for the time being, Boron steels should be restricted to the fine grain condition. While mold additions may be made, they are impractical from a steelmaker's standpoint and ladle additions are recommended. Seven and one-half pounds of Silcaz per ton is the recommended initial addition but this amount may be tappered off in subsequent heats to arrive at the most economical amount. The seller states that the protective agents in Silcaz insure that the amount of Boron added in the 7½ lb. per ton addition, 0.002 per cent is ample to achieve hardenability, and it is well below the amount which endangers hot working properties. The 7½ lb. per ton Silcaz addition is generally sufficient in itself for deoxidization purposes and in this regard is equivalent to approximately 1.1 lb. of aluminum per ton of steel. Where the practice has been to use larger amounts of aluminum, the producer recommends that a further addition of aluminum be made, the

amount to be the difference between normal practice and 1.1 lb. per ton. If the amount of Silcaz is reduced to, say, 5 lb. per ton with satisfactory effects on hardenability, additional aluminum should be added in line with the above cited arithmetic.

Production Precautions Necessary

It is not a new observation in metallurgy that some elements have a tremendous effect on the properties of certain metals and alloys even when present in very small percentages. To emphasize this point, it might again be pointed out that as little as 0.0006 per cent Boron has been reported as giving definitely favorable results on hardenability and the amount giving the optimum effect is of the order 0.001 to 0.003 per cent, while as little as 0.01 per cent may lead to trouble.

Quite obviously the very small amounts of Boron that need be added call for a high degree of skill in adding this to molten steel. Since Boron is so readily oxidized, it must be added only to a completely deoxidized steel bath, or it must be accompanied by enough strong deoxidizers to protect it until it is dissolved in the molten steel, otherwise the recovery and the consequent effect will be erratic. Furthermore, the amount of Boron to be added is so small that it could conceivably be quite difficult to obtain good dissemination throughout the steel if it were added in the form of, say, pure Boron or a very high Boron alloy. It would require only 0.06 lb., less than an ounce, to introduce 0.003 per cent Boron into a ton of steel under these conditions, and uniform dissemination would be a problem. For this reason, certain mills report that a diluted form of Boron is highly desirable. One Boron alloy that is being used is Ferro-boron[1] which has been commercially available for many years. At the present time two types are available, the approximate compositions of which are:

	(1) Per Cent	(2) Per Cent
Boron	15-20	10-12
Silicon	max. 3.00	approx. 3.00
Aluminum	max. 1.00	—
Carbon	approx. 0.50	approx. 1.50
Iron	balance	balance

As previously stated, several more or less complex alloys,[1] are also available which are designed to dilute the Boron, to provide accompanying elements that protect the Boron from oxidation, and also to exert to some extent their own specific effect on the steel. Typical of these are the following:

	(1) Per Cent	(2) Per Cent	(3) Per Cent	(4) Per Cent	(5) Per Cent
Boron	0.5	0.50	0.2	0.5	1- 2
Titanium	10.0	10.0	15.0	20.0	10-20
Silicon	35-40	35-40	—	—	20-30
Aluminum	6	7	10	13	10-20
Manganese	—	—	—	8	15-25
Calcium	—	10	—	—	—
Zirconium	6	4	—	4	—
Vanadium	10	—	25	—	—

Although some generalizations have previously been made herein, it is not feasible to give precisely the relative amounts of Boron and the more conventional alloying elements that will have the same effect on hardenability. This is because there has been, at least until very recently, no dependable method for determining the very small amounts of Boron present in the steel. However, comparisons between the amounts of Boron *added* and the other elements present as determined by analysis are quite readily made.

If the various alloys are added to a plain carbon steel containing 0.75 per cent manganese, and 0.25 per cent silicon, then the *addition* of 0.002 per cent Boron in the form of Alloy No. 2 listed here has the same effect on hardenability as 0.75 per cent manganese, 0.35 per cent chromium, 0.25 per cent molybdenum, 1.5 per cent nickel or 1.5 per cent silicon. The relative effects of the various elements vary with the amounts of them present so that the comparisons just made must be used with caution. It is, however, obvious that in Boron the industry has a potent alloying element that can go far in helping to overcome the present critical shortage in a number of important alloying elements.

Boron is no cure-all for all of the difficulties of the steel producer —neither is any other alloying element. It may exert certain secondary effects not yet encountered in the tests made, but so far no unfavorable ones have shown up. The Boron-bearing steels can be forged, rolled and machined at least as readily as conventional alloy steels of the same carbon content, and the same hardenability. Because of the small amount of Boron added, the very best alloy steel practice must be followed if consistent results are desired. There is considerable evidence that best results are obtained with steels made fine grained by the use of sufficient strong deoxidizers. Boron can be used to replace other alloying elements, particularly a number of those of which there is now a critical shortage, and thus help to increase the alloys available for making the urgently needed alloy steels for guns, tanks, armor and other war equipment.

Simple Tests Identify White Metals

QUALITATIVE TESTS FOR IDENTIFYING SOME COMMON WHITE METALS AND ALLOYS

MAGNETIC TEST	NITRIC ACID TEST					
Reaction to Magnet	Reaction to Conc. Acid	Reaction to Acid after Dilution	Color of the Solution	Iron Nail Test for Copper	Drop Test with Cupric Chloride in Hydrochloric Acid	Material Probably is
Magnetic	Reacts Slowly	Reacts Slowly	Pale Green	No Copper Plates out	Not required	Nickel
Magnetic* (slightly)	Reacts	Reacts Slowly	Greenish Blue	Copper Plates out	Not required	Monel
Non-magnetic	Reacts	Reacts	Bluish Green	Copper Plates out	Not required	Copper-Nickel Alloy containing less than 60% Nickel, e.g. Nickel-Silver
Magnetic	Reacts Slowly	Reacts	Brown to Black	Not required	Not required	Steel or Cast Iron
Non-magnetic	Reacts Slowly	Reacts	Brown to Black	Not required	Not required	Ni-Resist
Magnetic	No Reaction	No Reaction	Colorless	Not required	Not required	Straight Chromium Stainless Steel
Non-magnetic†	No Reaction	No Reaction	Colorless	Not required	Copper deposits when drop is diluted	Chromium-Nickel Stainless Steels e.g. "18-8"
Non-magnetic	No Reaction	No Reaction	Colorless	Not required	No deposition of copper occurs	Inconel

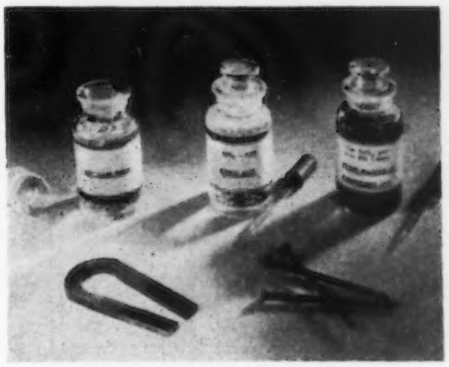
THE best method to insure thorough recovery of high nickel alloy scrap is segregation at the bench or machine where scrap originates. However, containers in which the scrap is collected can sometimes lose their identifying label, or otherwise be misplaced. Since many of the alloys have much the same appearance, the eye test is not a safe guide, and two materials mutually unsuited for each other's use easily may become mixed if this test is relied upon.

Mix-ups also are apt to occur in the storage of metals in warehouse and in the shop where dissimilar materials often are used along the assembly line. Sometimes the form and shape of these pieces are the same.

According to the International Nickel Co., there are four simple identification tests which can be carried out with the aid of inexpensive and readily available supplies. These are the magnetic test, the nitric acid test, the test for copper with an iron or steel nail, and a test with the use of cupric chloride solution.

Behavior of eight familiar metals under each of these tests is indicated in the accompanying table. Methods for carrying them out are almost as simple as the equipment required.

In the magnetic test, the magnet should be brought into contact with the specimen, care having been taken that no magnetic material such as iron or steel is beneath, or in the immediate vicinity of the specimen. The magnet will or will not be attracted to the specimen. When in doubt, and especially where the material seems to be non-magnetic, a more sensitive method is to balance the magnet, or the specimen, on the edge of a bench or desk and bring the specimen close to the magnet or vice versa. If the material is magnetic the balance will be upset and the movement of either the magnet or the specimen will be observed. Suspension of the magnet on a string, and carrying the specimen up towards it will bring similar results.



THIS readily available and inexpensive equipment is all that is needed to carry out the identification tests described. Included are a good magnet, concentrated nitric acid, a solution of 10 gm. of cupric chloride in 100 c.c. of concentrated hydrochloric acid.

In the nitric acid test, the surface of the test piece should be clean to insure direct contact between the acid and the metal. One or two drops of concentrated acid are then applied, and after a minute or two any reaction that takes place can be observed. After this reaction has been noted, the acid should be diluted with three or four drops of water, one drop at a time. Should the solution turn either green or blue, the third, or so-called "nail test," should be used.

A clean iron or steel nail is rubbed in the acid solution on the metal surface, the nail being kept in contact with the specimen. If the alloy contains copper, there will be a deposition of copper either on the nail, or on the surface of the metal under the acid solution. Finally, a drop or two of additional water should be added as the nail is rubbed around to prevent the deposited copper from redissolving in the acid.

Chief value of the fourth test is to distinguish Inconel from the 18 per cent chrome—8 per cent nickel type of stainless steel. In this test a drop of cupric chloride in hydrochloric acid should be applied to the cleaned metal surface and allowed to remain for two minutes. At the end of this period, three or four drops of distilled water should be added slowly, one drop at a time, to the solution on the metal. The solution may then be washed off.

If the sample is 18-8 stainless steel, the copper in the cupric chloride solution will be deposited on the metal surface, appearing as a coppercolored spot. If the sample is Inconel there will be no deposition of copper. Only a white spot will be left to indicate where the testing solution was applied.

Other articles on the reclamation and conservation of metals appeared in THE IRON AGE, Jan. 29, March 26, April 2, April 16 and Nov. 5, 1942.

Effect of Moisture in

IT has been known for some time that hydrogen, when present in the structure of iron and steel has pronounced embrittling effect upon the metal. Since the moisture that is forced into the cupola with the blast comes into such intimate contact with iron during the melting operation, it is conceivable that the hydrogen liberated under these conditions will be in a condition to be readily absorbed by the iron.

In the cast iron specimens discussed last week, where the moisture content of the blast was varied, a series of hydrogen analyses were made to determine if the hydrogen present in the metal did actually vary with the moisture content of the blast. The results were as follows:

1.49 grains moisture equals 0.00004 per cent H in the iron.

10.4 grains moisture equals 0.00009 per cent H in the iron.

21.2 grains moisture equals 0.00018 per cent H in the iron.

It is apparent from this that the hydrogen content of the metal does vary with the moisture content of the blast. It will be shown later what the importance of this is, since the values noted here appear to be extremely small. It must be remembered, however, that these values are given on a weight basis and represent a certain percentage by weight of a very light gas in a heavy metal. On a basis of comparable volumes, which will be given later, the figures are more impressive and will have greater meaning.

Boegehold's views on this subject are interesting. He believes the properties of cast iron, which are dependent upon the amount of combined carbon present and upon the ease with which it is retained by rapid cooling, are related directly to the amount of moisture in the blast. He indicates that the physical characteristics persist during remelting.[1]

[1] THE IRON AGE, *May 26, 1938, p. 43.*

It may be noted here that an increase of moisture in the cupola blast will produce greater metal shrinkages and increase the number of cracked castings in the manufacture of malleable castings even though the metal be duplexed subsequent to the original melting operation.

In the malleable duplexing process the metal is treated in an electric furnace or an air furnace subsequent to cupola melting and it appears from extensive observations that "cracks and shrinks" increase on wet days. This fact is well established in the minds of operating men, but quantitative data are hard to obtain.

There seems to be abundant proof that the presence of moisture in the air used for melting is responsible for the presence of hydrogen in the metal. There is considerable evidence also that hydrogen retards the rate of annealing of malleable iron. Although present in small percentages, the annealing time is prolonged a matter of days by the presence of hydrogen.[2]

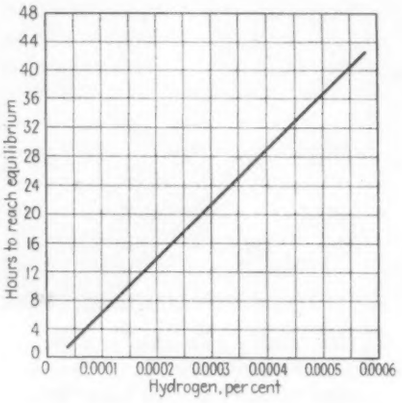


FIG. 7 — The effect of small amounts of hydrogen in lengthening annealing time of malleable iron.

[2] *Schwartz, Guiler, Barnett, A.S.M.* TRANSACTIONS, *December 1940, pp. 811-831.*

A patent has been granted to Schwartz covering this matter. A typical claim of this patent reads as follows:

> "A process for improving the physical properties and for shortening the annealing time of malleable iron which comprises melting the iron in a fuel fired furnace and maintaining the hydrogen in the melted iron under about 0.0005 per cent by controlling the moisture content of the air blast used to support combustion of the fuel."

This suggests the notable effect that hydrogen has upon the properties of the metal as well as on the time required for its manufacture. It connects these also with the moisture content of the air blast.

Before presenting any quantitative data it is necessary to add a note of explanation. The values given in each case are affected by a number of different factors. It is extremely difficult, under practical operating conditions, to maintain all the variables constant and to change the hydrogen content of the metal alone. Practical operating conditions give the kind of results desired since they are already translated into current practice.

The kind of data that are available suggest certain very definite trends which must not be assigned to any definite value too closely. With this in mind, a few tables can be presented which will illustrate the trends without insisting on absolute values. They are supported in each case by enough data to be suggestive but are so influenced by other variables as to be short of being absolute.

The effect of small amounts of

Blast Air

By R. J. COWAN
Surface Combustion Corp., Toledo

hydrogen on the annealing time of malleable iron is indicated in Fig. 7. This shows only the effect on first stage annealing in which the metal comes to equilibrium at a high temperature with a definite combined carbon concentration. It indicates that with a hydrogen content in the hard iron of only 0.0005 per cent, the time at the first stage may be prolonged to 36 hr., while with lesser amounts this time is reduced considerably.

Effect on Elongation

Fig. 8 shows in a similar manner the effect that hydrogen has on the elongation of malleable iron. A similar trend is shown for the tensile strength also but this curve is not shown because of the absence of certain intermediate values which leave a portion of the curve without sufficient confirmation.

The pronounced effect that hydrogen has upon malleable iron shows, in a remarkable manner, the persistence of this effect even after prolonged heat treatment. It is usually supposed that re-heating of metal containing hydrogen is sufficient to remove the hydrogen effects.

Analysis of the metal shows that the amount of hydrogen is greatly reduced by such treatment, but that its effects are thereby removed does not seem to follow since they persist in the fully annealed iron as indicated above. This illustrates the important fact that the hydrogen effect carries through subsequent operations even after hydrogen has been removed from the metal.

It is not intended to suggest that the physical properties of malleable iron cannot be modified by other means, such as by altering the silicon-carbon relationships, but intends only to show what will happen when iron of a constant analysis has its hydrogen content changed.

. . . In this, the conclusion of a two-part article, the relationship between moisture content of the blast and the hydrogen content of the metal is discussed and data are presented to show the effect of hydrogen on the characteristics of steel and malleable iron. Included is a description of a moisture controlling unit utilizing lithium chloride.

One large producer of malleable iron has installed Kathabar moisture control equipment, manufactured by the Surface Combustion Corp., Toledo, for controlling the moisture content of the air blast used for melting. This suggests the importance of the problem and the attention it is receiving at the present time.

The test materials previously referred to in this article were produced in a cupola blast that had been moisture conditioned by the Kathabar system. These units employ lithium chloride as the moisture absorption medium. Operation can be successfully maintained at any desired moisture content—as low as one grain per cu. ft. Because of the simplicity of the design and operation of the Kathabar system, operating and maintenance costs are held to a minimum. Kathabar units have been in operation on cupolas for a number of years.

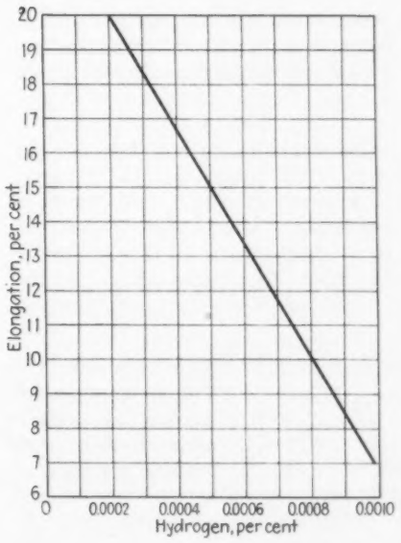


FIG. 8—Effect of hydrogen on the elongation of malleable iron. A similar effect on tensile values has been noted.

When the use of dry blast was first applied to the blast furnace, the results were outstanding and commanded the attention of manufacturers all over the world. Two things especially were notable—a saving in coke and a uniformity of operation, both of which were very attractive.

In the early installations, moisture was removed from the blast by freezing which, in the case of a furnace requiring 50,000 cu. ft. per min., meant the removal of 30 to 50 tons of ice a day. The mechanical difficulties encountered caused the use of this equipment to be discontinued although its merits were well recognized. More recently, the matter has been reconsidered and with modern equipment a number of installations have been set up and others are in process of building.

The amount of water removed from the air entering the blast is really surprising. It has been es-

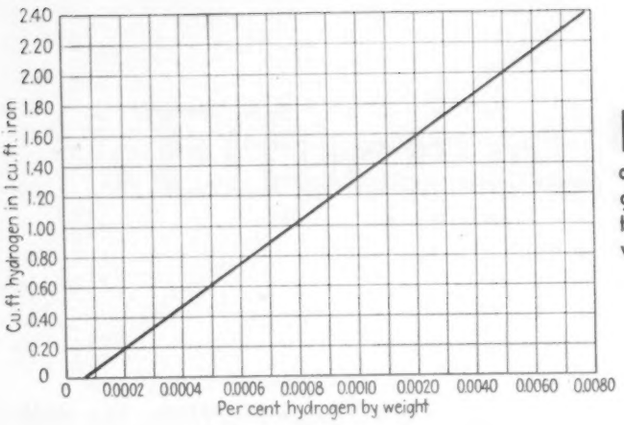


FIG. 9 — Relationship between percentage of hydrogen in metal and the corresponding volume of gas per cu. ft. of iron.

timated that in the case of a furnace using 45,000 to 50,000 cu. ft. per min. of air, the removal of each grain of water will mean a little more than 5 net tons of water per day. The removal of this water to a point of practical efficiency will increase the iron production and at the same time reduce the consumption of coke.

Data are available which show an average increase of 16 per cent in the amount of iron made and a reduction of 4¼ per cent in coke consumption.[3] This is based on the use of air dried to approximately ¾ grains per cu. ft.

[3] *"Air Conditioning Benefits Blast Furnace Operation," by E. K. Miller,* STEEL, *Nov. 10, 1941, pp. 88, 91, 94, 112 and 113.*

Opinion among blast furnace operators varies as to the advantages of using dry blast. Some have maintained that air saturated with moisture at all times will produce satisfactory results. Without doubt, this will give the advantage of uniform furnace operation but it loses the feature of coke saving and metal increase. Furthermore, it does not take into account the increased hydrogen content of the metal which results from the higher moisture content of the air blast.

For many years it has been observed that the product from different furnaces varies out of accord with variations in the chemical analysis of the iron. Some users of pig iron insist that their metal charges be made up of iron from two or more blast furnaces in order to offset these unknown differences in the iron.

Many attempts have been made to account for this on the basis of burden used and the details of furnace operation. It is known also that these differences persist through subsequent melting and heat treating operations. Heat treaters talk of "inheritance," by which they mean those metal characteristics which carry along through successive heat treatments. Evidence continues to accumulate in a number of different fields that hydrogen in combination in the iron is accountable for these anomalies in the metal.

In the light of these findings, this matter should have consideration when it enters pig iron since this is the primary source of the metal where "inheritance" begins. It will be shown later that unbelievably small percentages of hydrogen have deleterious effects upon iron and steel products and the sources of this contamination must be guarded against at all stages of manufacture.

It may be well at this point to consider some of the effects that have been noted regarding the presence of hydrogen in steel. Early metallurgists recognized a point on the iron-carbon equilibrium diagram below the lower critical point *A*, which they called the "hydrogen point." It extended across the diagram at a temperature of about 400 to 475 deg. F., which is the location of the critical point now designated as A_0 in recent diagrams.

The effect is not sharply defined at any definite temperature and consequently there has been some question as to speaking of it as a "critical point." There is no doubt, however, that a pronounced effect is produced through a range of temperatures well below 1300 deg. F. This is the region of the "blue heat" range which is carefully avoided by metallurgists. Hydrogen is known to have a strong influence on the properties of steel in this range of temperature and recent studies have emphasized the importance of this influence.

There is also the matter of "flaking" in steel. Once attributed to oxides, then to "sonims" (nonmetallic inclusions) it has now been traced largely to the effect of dissolved hydrogen in the metal. Studies conducted at the University of Illinois appear quite conclusive in this regard. The "flakes" manifest themselves as minute or incipient cracks that are deep-seated in the structure of rail steel and result in rail failure by shatter cracking. By holding these rails for various lengths of time at different low temperatures, the hydrogen was caused to diffuse outwardly and the flakes did not occur, although there were an abundance of them in the

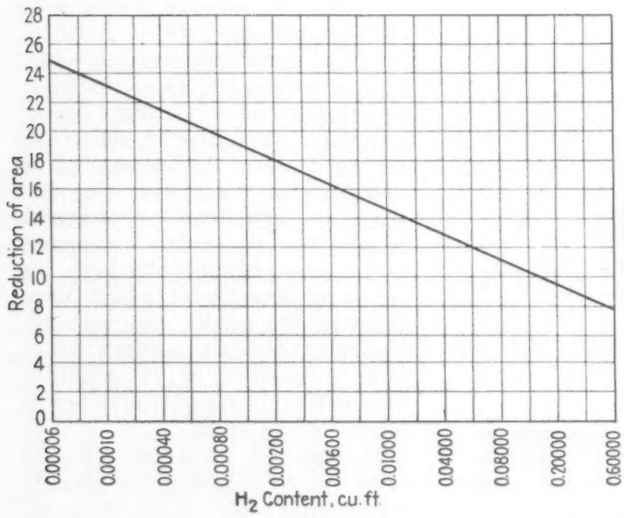


FIG. 10—Effect of hydrogen on reduction of area in open hearth steel used for rails.

same rails when allowed to cool in air. It is interesting to note that the amount of hydrogen present in this steel was so small as to be undeterminable by the apparatus available for this purpose.

One analysis, noted as having been determined by the Bureau of Standards, gives the value of 0.0004 per cent hydrogen. This seems to be a very small amount, but it is significant that in reality this is equivalent to about one-third the volume of the metal.

Honda's Calculations

Honda[4] has made a theoretical calculation of the pressures involved when hydrogen comes out of solution in a small metal cavity. "On the assumption that a body of steel just below its solidification temperature is saturated with 0.0023 per cent hydrogen, the pressure is inconsiderable until 950 deg. F. is reached, but then rises rapidly to a peak of about 500,000 lb. per sq. in. at 500 deg. F. and then decreases linearly to nil at absolute zero. This is for a cavity of 0.0135 cu. mm. The temperature of maximum pressure coincides with the temperature of flake formation."

As pointed out above, the usual analysis of hydrogen in iron is expressed in weight percentages. On this basis, the amounts found are very small. In fact, the determination of hydrogen in this way requires considerable analytic skill. On the basis of volumes involved, the amount of hydrogen in the steel assumes more significant figures. This is brought out by reference to Fig. 9 which has been prepared for convenient comparisons. By using this chart, it is possible to determine the relationship between the percentage of hydrogen in the metal and the corresponding volume of gas in a cubic foot of the iron. This makes the percentages appear more significant when viewed in this light.

The effect of hydrogen on steel and steel rails in particular has been studied very extensively in Germany.[5] Fig. 10 shows some of these values, indicating this effect on reduction of area in open hearth steel used for rails.

The effects of hydrogen in small amounts on the number of bends and twists of steel wire is illustrated in Fig. 11. This is not a record of any standard test but shows the effects of hydrogen on certain arbitrary "bend" and "twist" tests of steel wire taken from the articles by Bardenheuer referred to previously. The temperatures shown on the curves are in Centigrade and represent the point from which the specimens are quenched. The ordinates represent the amount of hydrogen given off during heating. The steel is the same for both tests.

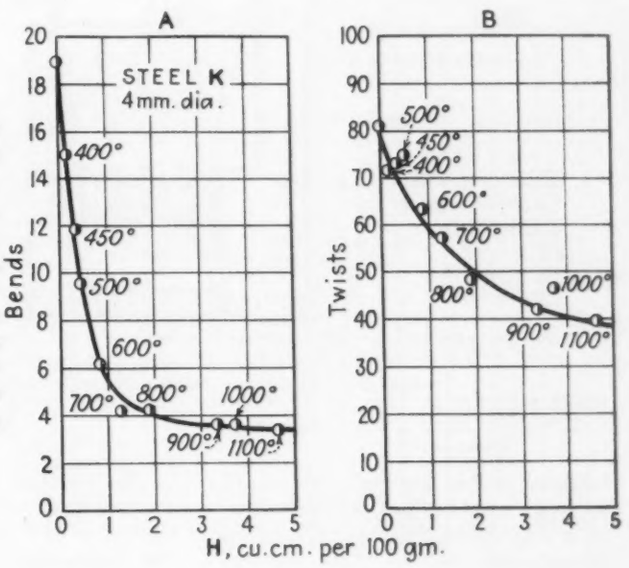


FIG. 11—Effect of small amounts of hydrogen on bending and twisting capacity of steel wire. Temperatures in this graph from Bardenheuer are in degrees Centigrade. The ordinates are the amount of hydrogen given off during heating.

The manner in which hydrogen causes the cracking of metal sections seems to be somewhat as follows: Atomic hydrogen has the power of penetrating metals. If this comes out of solution in the interior of the metal at a small cavity, blow hole, or non-metallic inclusion, the atoms combine to form molecular hydrogen, H_2, which is insoluble in steel and cannot, therefore, diffuse away.

An experiment is recorded in which a steel bar was bored to provide a hollow cylinder that could be fitted with a pressure gage. Hydrogen was evolved from the outer surface of the tube by electrolysis and after a short time the pressure rose on the inside to 4300 lb. per sq. in., the limit of the gage.

Of course, all of the hydrogen does not come out of solution in this way so that a double effect is to be noted; that which accounts for cracking and that which remains in solution and causes embrittlement.

Hydrogen has been observed also in open hearth steel. The values seem to run between 0.0003 and 0.001 per cent. This is the usual range although higher values are frequently obtained. One set of authors give information on 127 heats of steel made throughout the year which show higher hydrogen contents during the warmer months and suggest that this may be associated with the moisture content of the air during this period.[6]

The presence of hydrogen in metals and its effect is becoming a matter of increasing importance. As an evidence of the work being done, it may be noted that the U. S. Department of Agriculture, which conducts a micro-film service, has a film which gives a selected bibliography of 500 references on hydrogen in steel.

Summary

It has been shown as a result of experience and experiment that the presence of an excessive amount of moisture in the air blast used in various melting operations has a deleterious effect upon the resulting metal product. The full extent of this effect is not

[4] METAL PROGRESS, *Vol. 31, Nov. 4, 1937.*

[5] STAHL AND EISEN, *"Effect of Hydrogen on Steel," P. Bardenheuer, Vol. 57, No. 21, May, 1937.*

[6] A.S.M., TRANSACTIONS, *Vol 25, pp. 889-903 and 1177-1184.*

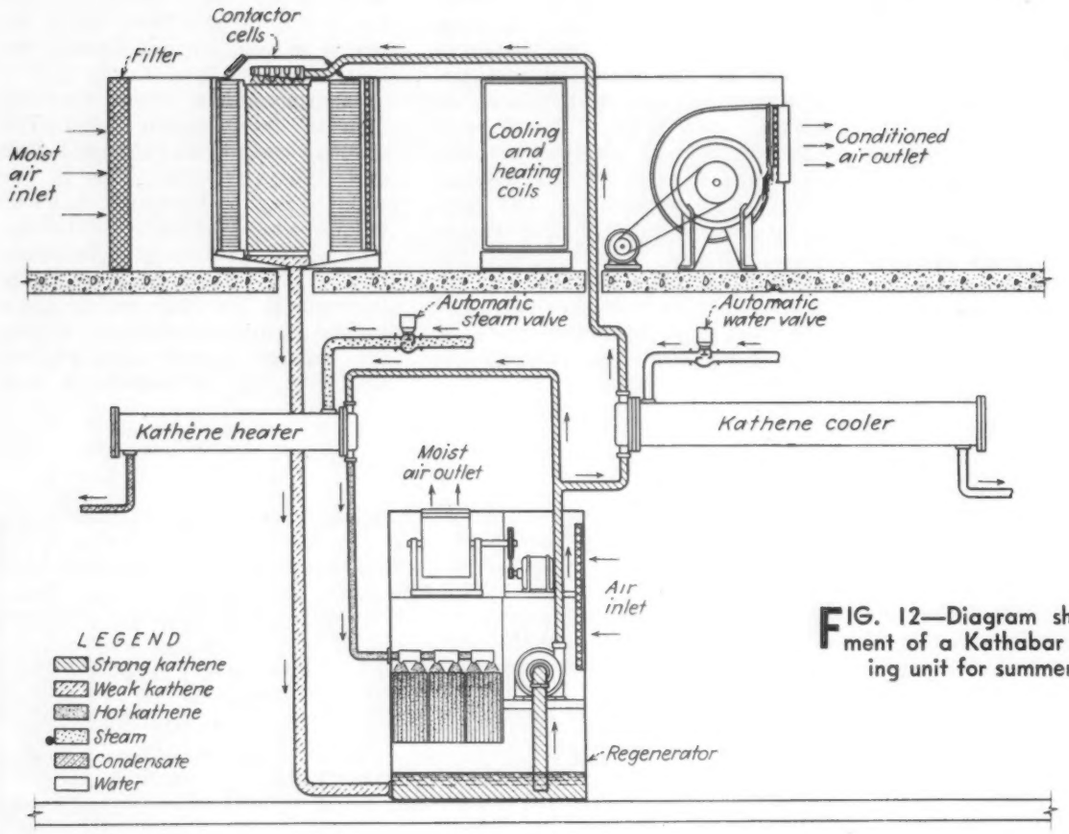


FIG. 12—Diagram showing arrangement of a Kathabar blast conditioning unit for summer operation.

known. It has become customary to modify this effect, as far as cupola and blast furnace operation are concerned, by the use of larger amounts of fuel. The methods for doing this have been worked out both theoretically and practically.

Some operators go so far as to add moisture to the air to provide saturation at all times and thereby overcome the usual fluctuations incident to the weather. This practice loses sight of the fact that moisture in the air adds hydrogen to the metal, and that hydrogen in surprisingly small amounts has an injurious effect upon both iron and steel.

It also increases the number of cracked castings and prolongs the annealing time in producing malleable iron; it retards graphitization and increases the depth of chill in cast iron; it imparts properties to pig iron that persist through successive melting operations and cause "flaking" in steel rails and otherwise impairs the physical properties of steel, causing brittleness, low elongation and small reduction of area of standard specimens.

The lowered melting rate which follows from the loss of temperature that is a consequence of adding large volumes of moisture to the blast may be overcome by using a larger amount of coke. But this does not take care of the increased amount of hydrogen that enters the metal under these conditions. Obviously, a large part of this will be swept out of the metal during cooling and escape along with the other gases, but there will remain locked in the metal an amount proportional to the amount in the blast. This is sufficient to cause the effects noted.

Removal of this moisture from the blast for cupolas and blast furnaces is being efficiently handled in many plants by the Surface Combustion Corp.'s Kathabar system. This equipment is designed to give considerable flexibility and ease of control in operation and is capable of handling any required volume of air. With this system it is possible to provide a blast with a moisture content as low as 1 grain per cu. ft.

Fig. 12 shows the arrangement of the various components of a Kathabar installation, arranged for summer operation. In operation, the outside air is drawn through a contactor cell, in which is provided a chemical wash called Kathene. This watch is essentially lithium chloride. The Kathene, a salt solution, acts as the absorption medium. As it has a very low vapor pressure, its absorbing capacity is determined accordingly.

The rate of absorption of the Kathene solution is regulated automatically by varying the concentration of the solution. A float hydrometer opens or closes a steam valve, which in turn operates the regenerator. This maintains the proper concentration of the solution to provide for the required moisture content of the treated air.

The Kathene solution can be used continuously without replacement and is non-corrosive when used with the patented process of selected surfaces and in combination with a common inhibitor. It is a single salt solution and is not subjected to variation or separation of one salt from the other.

Significant Steels Commonly Used for Specific Articles

THE accurate segregation of scrap is of paramount importance today, and numerous handlers of scrap have indicated that the proper identification of articles passing through their yards is causing them great difficulty. So many requests have come to THE IRON AGE for a list of articles and the probable steels from which they are made that the following classification prepared by the American Iron and Steel Institute is presented in order to facilitate the movement and classification of the large volume of scrap that must currently be handled in an intelligent manner. The numbers used are SAE and/or AISI designations and the prefix letters are as follows: A = basic open hearth alloy steel; B = bessemer steel; C = basic open hearth steel; D = acid steel; E = electric furnace alloy steel; BQ = semi-finished bessemer steel, forging quality; CQ = semi-finished basic open hearth steel, forging quality; CB = either open hearth or bessemer steel at option of manufacturer.

Intended Use	Steel Grade and Number	
	Carbon Steels	Alloy Steels
Agricultural implement parts	C 1010, C 1020, CQ 1020, CQ 1090	
Agricultural implement wheel spokes	C 1008, C 1015	
Aircraft parts		
Bolts		E 2330
Camshafts		E 2512, E 2515, E 3310, E 3315
Connecting rod bolts		E 2330
Connecting rods		E 4138, E 4340
Crank case bolts		E 2330
Crankcases		E 4337
Crankshafts		E 2512, E 4138, E 4340
Engine gears		E 2512, E 2515
Engine parts		E 4340
Engine valve springs		E 6150
Forgings		E 4132, E 4616, E 4618, E 4640, E 4643
Keys		E 2330
Knuckle pins		E 6150
Piston pins		E 2512, E 3310, E 3315, E 6150
Propeller shafts		E 2330, E 4138, E 4340
Rocker arms		E 6150
Structural members		A 4133
Structural parts		A 4130, E 4132
Studs		E 2330
Transmission gears		E 4640
Alemite fittings	BQ 1110, BQ 1112, BQ 1113	
Automatic screw machine parts	BS 1112, B 1113, CQ 1131	
Automobile parts		
Alemite fittings	BQ 1110, BQ 1112, BQ 1113	
Axle drive pinions	CQ 1116	
Axle housing flanges	C 1020, CQ 1020	
Axle shafts		A 1330, A 3146, A 4023, A 4062, A 4142
Axle shafts, truck		A 3150
Axles		A 3140, A 4150
Axles, I-beams	CQ 1040	
Bearing races	CQ 1016, CQ 1017, CQ 1018	A 4608, E 4609, E 52100
Bearings		A 3120, A 4615, A 4617, E 4620, A 5117, E 52098, E 52099, E 52100
Brake pedals	CQ 1025	
Bumpers	CQ 1075, CQ 1079, CQ 1090	
Bushing nuts	BQ 1112	
Bushings	CQ 1020	
Cam shafts	CQ 1017, CQ 1018, CQ 1020, CQ 1040	A 2315
Cams	CQ 1020	
Cap nuts for disk wheels	BQ 1112	
Chassis frame members	C 1020, C 1025	
Clutch disks	CQ 1016	
Clutch pedals	CQ 1025	
Clutch shafts		A 5045
Connecting rods	CQ 1037	
Crankshafts	CQ 1017, CQ 1018, CQ 1040, CQ 1045	
Cylinder head studs		A 4042
Differential gears		A 4820, A 5117, A 5130
Differential pinion gears		A 3121, A 4023
Differential ring gears		A 1320, A 4047, A 4615, E 4620
Drive pinions		A 1320, A 4027, A 4620, A 5117
Frames	C 1020, C 1025	
Gears	CQ 1015, CQ 1020 CQ 1021, CQ 1025, CQ 1045	A 2315, A 2341 A 2345, A 4619 A 4620, A 4822
Hubs	CQ 1045	
Jack handles	C 1020, C 1025	
Jack screws	BQ 1112	
King bolts		A 2315
King pins		A 4615

Intended Use	Steel Grade and Number	
	Carbon Steels	Alloy Steels
Piston pins	CQ 1116, CQ 1118, CQ 1120, CQ 1121	A 2315, A 5117, E 6150
Propeller shafts		E 2330, A 3141,
Ring gears		A 4027, A 4615, A 5117
Side gears		A 4023
Spark plug shells	BQ 1110, BQ 1112, BQ 1113	
Splines		A 4620, E 4620
Springs, leaf		A 6150
Steering arms		A 1335, A 1340, A 3045, A 3135, A 4042
Steering ball joints		A 2315
Steering knuckle supports		A 1330, A 3045
Steering knuckles		A 1340, A 3135, A 4047
Structural parts		A 1330
Sway bars		A 4062
Thrust washers	CQ 1021	
Tire rims	C 1025	
Transmission gears		A 1340, A 1342, A 3121, A 4023, A 4032, A 4642, A 4815, A 4820 A 5145
Transmission main shaft		A 4024
Transmission main shaft gear		A 5045
Universal joints	CQ 1136	
Valve tappets		A 2315
Wheel rims	C 1025, CQ 1020	
Wheel spiders	CQ 1015	
Axle housing flanges	C 1020, CQ 1020	
Axle shafts		A 1330, A 3146, A 4062, A 4142
Axle shafts, truck		A 3150
Axles	CQ 1055	A 3140
Bale ties, see merchant wire products		
Balls, bearing		A 4615, A 4617, A 4620, A 5117, E 52098, E 52099, E 52100
Balls, grinding	CQ 1090	
Barbed wire, see merchant wire products		
Bearing races	CQ 1016, CQ 1017, CQ 1018	A 4608, E 4609, E 52100
Bearings		A 3120, A 4615, A 4617, A 4620, A 5117, E 52098, E 52099, E 52100
Bessemer screw stock	BQ 1110, BQ 1112, BQ 1113	
Bits, mine	CQ 1074, CQ 1079	
Blades, grader	CQ 1090	
Blades, knife	CQ 1095	
Boiler rivets	C 45	
Bolts	C 1020	A 4037, A 4042, A 4142
Aircraft		E 2330
Cold headed or forged	CQ 1006, CQ 1008, CQ 1012, CQ 1015, CQ 1016, CQ 1017, CQ 1018, CQ 1020, CQ 1030, CQ 1032, CQ 1035, CQ 1037, CQ 1040, CQ 1042, CQ 1109	A 3135, A 3140
Collar	CQ 1020	
Double extension	CQ 1016	
Hot headed	B 1111, C 1114, C 1120, B 1111, C 1020, BQ 1110	
King		A 2315
Steering arm		A 3121
Stud and collar	CQ 1020	
Brake pedals	CQ 1025	
Brake shoe parts	C 1020, CQ 1025, C 1025	

Intended Use	Steel Grade and Number	
	Carbon Steels	Alloy Steels
Bumpers, automobile	CQ 1075, CQ 1079, CQ 1090	
Bushing nuts	BQ 1112	
Bushings, automobile	CQ 1020	
Cam shafts	CQ 1017, CQ 1018, CQ 1020, CQ 1040	A 2315, E 3310
Cams	CQ 1020	
Cap nuts for disk wheels	BQ 1112	
Cap screws	CQ 1020	
Chain, die lock		A 2341
Chain links and guides	CQ 1020, CQ 1136	
Chain rings	C 1020	
Chain rollers	C 1020	
Chain side bars		A 1340, A 3140
Chains		E 4609
Chassis frame members	C 1020, C 1025	
Clips, spring	C 1020	
Clutch disks	CQ 1016	
Clutch pedals	CQ 1025	
Clutch shafts		A 5045
Coil springs	CQ 1051, CQ 1056, CQ 1062, CQ 1066, CQ 1089, CQ 1095, BQ 1009	A 4062, A 9255, A 9260, A 9262
Cold punched nuts	C 1112, CQ 1017, CQ 1018, CQ 1109, CQ 1110, BQ 1110	
Collar bolts	CQ 1020	
Collars, drill		A 3140, A 3141, A 3146
Concrete reinforcement bars:		
Hard grade	CB 80	
Intermediate grade	CB 70	
Structural grade	CB 55	
Concrete reinforcement wire	CB 81	
Connecting rod bolts		E 2330
Connecting rods	CQ 1037	
Connecting rods, aircraft		E 4138, E 4340
Crank cases, aircraft		E 4337
Crank pins	CQ 1050	
Crankshafts	CQ 1017, CQ 1018, CQ 1040, CQ 1045	
Crankshafts, aircraft		E 4138, E 4340
Cylinders, gas		A 4130
Cylinders, pneumatic tool	CQ 1020	
Dead soft steel	B 1006, CB 1008	
Die lock chain		A 2341
Differential gears		A 3120, A 3121, A 4820, A 5117, A 5130
Differential pinion gears		A 3121, A 4023
Differential ring gears		A 1320, A 4047, A 4615, E 4620
Double extension bolts	CQ 1016	
Drag links	CQ 1020	
Draw bars	CQ 1020	
Drill collars		A 3140, A 3141, A 3146, A 4140
Drill stems		A 3146
Drive pinions		A 1320, A 4027, A 4620, A 5117
Drive pinions, axle	CQ 1116	
Electrical Bars	CQ 1004	
Fence and fence wire, see merchant wire products		
Flame hardened, Objects to be		A 4140
Flanges, axle housing	C 1020, CQ 1020	
Flat springs		A 4065, A 6150, A 9255, A 9260, A 9262
Fly wheel rings	CQ 1040, CQ 1045	
Forgings, aircraft		E 2512, E 2515, E 4132, E 4616, E 4618, E 4640, E 4643
Frames, automobile	C 1020, C 1025	
Frames, refrigerator	C 1020	
Fuse wire	CQ 1004	
Gas cylinders		A 4130
Gears	CQ 1015, CQ 1020, CQ 1021, CQ 1025, CQ 1045	A 2315, A 2341, A 2345, A 3115, A 3140, A 4619, A 4620, A 4822

Intended Use	Steel Grade and Number	
	Carbon Steels	Alloy Steels
Gears, see also differential, pinion, ring, side, tractor, transmission		
Grader blades	CQ 1090	
Grinding balls	CQ 1090	
Gun blocks	CQ 1020, CQ 1120	
Gun parts	CQ 1120, CQ 1121	
Hammers		A 6150
Handles, jack	C 1020, C 1025	
Handles, knife	CQ 1004	
Hardware, pole line	C 1020, C 1025	
Hinge parts	C 1020, C 1113	
Hot pressed nuts	C 1020, C 1120, B 1111, B 1111, CQ 1017, CQ 1018	
Hubs, automotive	CQ 1045	
Jack handles	C 1020, C 1025	
Jack screws	BQ 1112	
Joints, oil well tool		A 3140, A 4142
Joints, universal	CQ 1136	
Keys		E 2330
King bolts		A 2315
King pins		A 4615
Knife blades	CQ 1095	
Knife handles	CQ 1004	
Knuckle pins		A 2315
Knuckle pins, aircraft		E 6150
Links, chain	CQ 1020, CQ 1136	
Lock parts	CS 1113	
Lock washers	CQ 1060, CQ 1074	A 9255, A 9260
Magnet cores	C 1002	
Market wire, see merchant wire products		
Merchant wire products	C 1006, C 1008, C 1009, C 1014, C 1020, B 1006, B 1009, CB 1008	
Mine bits	CQ 1074, CQ 1079	
Motor frames	C 1020	
Nails, see merchant wire products		
Needle wire	D 1089, D 1095, CQ 1089, CQ 1095	
Nuts, bushing	BQ 1112	
Nuts, cold punched	C 1112, CQ 1017, CQ 1018, CQ 1109, CQ 1110, BQ 1110	
Nuts, hot pressed	C 1020, C 1120, B 1111 CQ 1017, CQ 1018	
Oil tempered spring wire	D 1064, D 1074, D 1079, CQ 1064, CQ 1074, CQ 1079	
Oil well sucker rods		A 1335, A 4622
Oil well tool joints		A 3140, A 4142
Open-hearth screw stock	CQ 1111, CQ 1114, CQ 1117, CQ 1118, CQ 1119, CQ 1120, CQ 1121, CQ 1131, CQ 1136	
Pedals, brake	CQ 1025	
Pedals, clutch	CQ 1025	
Pinion gears		A 4615
Pinion gears, differential		A 3121, A 4023
Pinions, drive	CQ 1116	A 1320, A 4027, A 4620, A 5117
Piston pins	CQ 1115, CQ 1116, CQ 1118, CQ 1120, CQ 1121	A 2315, E 3310, A 5117
Piston pins, aircraft		E 6150
Pitman arms	CQ 1037, CQ 1045	
Pitman shafts		A 3121
Pivot pins	CQ 1020	A 2315
Plating wire	C 1006, C 1008, C 1009	
Plow shares	CQ 1069	
Pneumatic tool cylinders	CQ 1020	
Pole line hardware	C 1020, C 1025	
Propeller shafts		A 3141, E 2330
Propeller shafts, aircraft		E 4138, E 4340
Pump shafts		A 3115, A 5117
Reamers, rock drill		A 3116
Refrigerator frames	C 1020	
Reinforcement, concrete bars		
Hard grade	CB 80	
Intermediate grade	CB 70	
Structural grade	CB 55	
Reinforcement, concrete, wire	CB 81	
Rim side rings, truck	CQ 1035	
Rims, tire	C 1025	
Rims, wheel	C 1025, CQ 1020	
Ring gears		A 1320, A 4047, A 4615, A 5117
Rings, chain	C 1020	
Rings, fly wheel	CQ 1040, CQ 1045	
Rivets	C 55, CS 1006, CQ 1002, CQ 1003, CQ 1004, CQ 1006	
Rivets, boiler	C 45	
Rock drill reamers		A 3116
Rocker arms, aircraft		E 6150
Rods, sucker		A 1335, A 4622
Roller bearings		A 4615, A 4617, A 4620, A 5117, E 52098, E 52099, E 52100
Rollers, chain	C 1020	
Sash bars	B 1009	
Sash parts	C 1010	
Scarifier teeth	CQ 1079	
Scraper blades	CQ 1079, CQ 1090	
Screws, cap	CQ 1020	
Screws, jack	BQ 1112	
Scythe blade heels	CQ 1020	
Shackles	CQ 1020	
Shafting	C 1032, C 1025, B 1111, BQ 1110, CQ 1018, CQ 1020, CQ 1025, CQ 1055, CQ 1136	A 2345, A 4023, A 4140, A 6150
Shafts, axle		A 1330, A 3146, A 3150, A 4062, A 4142
Shafts, clutch		A 5045
Shafts, main transmission		A 4024
Shafts, propeller		A 3141, E 2330, E 4138, E 4340
Shafts, pump		A 3115, A 5117
Shifter levers	CQ 1037	
Shifter shoes	CQ 1020	
Shifter yokes	CQ 1020	
Side gears		A 4023
Spark plug shells	BQ 1110, BQ 1112, BQ 1113	
Spiders, wheel	CQ 1015	
Spikes	C 1020	
Splines		A 4620, E 4620
Spokes, wheel, agricultural	C 1008, C 1015	
Spring clips	C 1020	
Spring shackle bushings	CQ 1116	
Springs, coil,	CQ 1051, CQ 1056, CQ 1062, CQ 1066, CQ 1089, CQ 1095 BQ 1009	A 4062, A 9255, A 9260, A 9262
Springs, engine valve, aircraft		E 6150
Springs, flat	CQ 1079	A 4065, A 6150, A 9255, A 9260, A 9262
Springs, leaf		A 6150
Stabilizer bushings	CQ 1116	
Steering arm bolts and studs		A 3121
Steering arms	CQ 1020	A 1335, A 1340, A 3045, A 3135, A 4042
Steering ball joints		A 2315
Steering knuckle supports		A 1330, A 3045
Steering knuckles		A 1340, A 3135, A 4047
Stove parts	C 1010	
Strand, wire	D 1034, CQ 1034, CQ 1051	
Structural members, aircraft		A 4133

Intended Use	Steel Grade and Number	
	Carbon Steels	Alloy Steels
Structural parts, aircraft		A 4130, E 4132
Structural steel	C 50, C 55, C 60, C 1017, CB 1008, C 1030	
Stud and collar bolts	CQ 1020	
Studs, cylinder head		A 4042
Studs, steering arm		A 3121
Sucker rods, oil well	CQ 1035	A 1335, A 4622
Swaging wire	CQ 1004	
Sway bars	CQ 1069	A 4062
Swivels	C 1025	
Tappets, valve		A 2315
Telephone and telegraph wire	CQ 1004, CQ 1005	
Thrust washers	CQ 1021	
Tie rods	CQ 1020, CQ 1025	
Tire rims	C 1025	
Tooth followers		A 3115
Tool cylinders, pneumatic	CQ 1020	
Tool joints, oil well		A 3140, A 4142
Tools	CQ 1055, CQ 1079	A 9260
Tools, hand		A 6150
Tools, oil hardened	CQ 1061	
Tools, track		A 5150, A 9255
Tools, water hardened	CQ 1069, CQ 1089	
Tractor gears		A 4620
Tractor parts		A 1330
Transmission gears		A 1340, A 3045, A 3121, A 3140, A 4023, A 4032, A 4642, E 4640, A 4815, A 4820, A 5145
Transmission main shafts		A 4024
Universal joints	CQ 1136	
Valve tappets		A 2315
Wagon tires	C 1008	
Washers, lock	CQ 1060, CQ 1074	
Washers, thrust	CQ 1021	
Welding wire	C 1005, CQ 1004, CQ 1005, CQ 1006, CQ 1008, CQ 1009, CQ 1014, CQ 1026	
Wheel rims	C 1025, CQ 1020	
Wheel spiders	CQ 1015	
Wheel spokes	C 1008, C 1015	
Window sash	C 1010	
Wire		
Bright for plating	C 1006, C 1008, C 1009	
Chain	CQ 1006	
Cold heading (see cold heading)		
Concrete reinforcement	CB 81	
Fuse	CQ 1004	
Horse nail	CQ 1004	
Lock washer	CQ 1060	
Merchant, and merchant wire products	C 1006, C 1008, C 1009, C 1014, C 1020, B 1006, B 1009, CB 1008	
Needle	D 1089, D 1095, CQ 1089, CQ 1095	
Rope	D 1047, D 1054, D 1059, D 1068, D 1077, CQ 1047, CQ 1054, CQ 1059, CQ 1068, CQ 1077	
Shape	CS 1005, CQ 1005, CQ 1006, CQ 1008, CQ 1009	
Spring	CQ 1051, CQ 1056, CQ 1062, CQ 1066, BQ 1009	
Spring, oil tempered	D 1064, D 1074, D 1079, CQ 1064, CQ 1074, CQ 1079	
Strand	D 1034, CQ 1034, CQ 1051	
Swaging	CQ 1004	
Telephone and telegraph	CQ 1004, CQ 1005	
Welding	B 1006, CS 1005, CQ 1004, CQ 1005, CQ 1006, CQ 1008, CQ 1009, CQ 1012, CQ 1014, CQ 1026	
Wrenches	CQ 1021	
Yokes, shifter	CQ 1020	A 6150

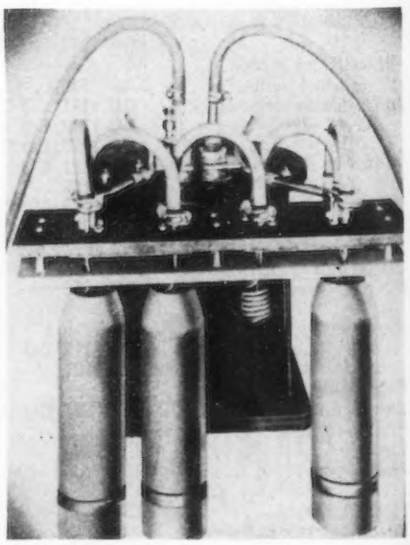
Annealing Four 75-mm Shells Simultaneously

IN the modification of 75 mm. shells for a revised nose fitting, it was found that the tap and chaser life was exceedingly short. Investigation showed the trouble to be caused by hardened shot from a shot-blasting operation lodging in the threads and interfering with the thread chaser action.

In order to relieve this condition, it was necessary to heat the inside of the nose to annealing temperature without having the heat penetrate the shell and change its physical characteristics. By having specially designed coils, one Model 1070 Thermonic induction generator did this annealing operation at the rate of four shells in 50 secs.

One of the features of this particular job is said to be the ease and simplicity of its operation. Thermonic induction heating is applied instantly by push button control. A continuous flow of production follows at the rate of approximately 280 units an hr. Skilled labor is not necessary. After the preliminary setup no adjustment need be made since the operation is completely automatic.

The temperature can be controlled to the exact area desired with no annealing beyond, and no metallurgical change. Another important feature is the remarkably low cost of this Thermonic heat, which is a considerable factor in these days of current saving.



THERMONIC induction generator with three 75-mm. shells in position for annealing. The fourth shell has been removed to show the specially designed induction coil which permits heating the inside of the nose without reaching the shell and thus alter its physical characteristics.

Two Methods of Brazing High Speed Steel Tips

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. . . Copper brazing and hardening of high speed steel tips can be done consecutively with a hydrogen atmosphere furnace. Silver soldering and tempering is performed with an oxyacetylene torch, using hardened tips. Although this article has been released by the Chief of Ordnance, the opinions expressed are those of the authors and not those of the Ordnance Department.

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THE present emergency has focussed attention on the problem of conserving high speed steel because it contains relatively large percentages of strategic tungsten, molybdenum, chromium, vanadium and cobalt. High speed steels containing 18 per cent tungsten are being replaced by molybdenum high speed steels in which the tungsten content has been substantially reduced. Despite this important advance, much more remains to be done since the content of the other strategic elements is the same and there is a great demand for both tungsten and molybdenum for other uses besides high speed steel.

One method of conserving high speed steel is to increase tool efficiency by devoting proper attention to such factors as tool design, heat treatment, grinding procedure, and cutting conditions. However, there still remains the problem of waste due to the fact that only a very small amount of a tool is actually used up in cutting. To minimize this condition, the possibility of making tools by joining high speed steel tips to low alloy steel shanks was investigated at Watertown Arsenal by the authors.

Success along these lines with carbide tipped tools suggested that brazing might also be applied to the tipping of tools with high speed steel. To apply copper brazing to the tipping of tools with high speed steel it is necessary that the brazing operations be carried out at a temperature that will permit satisfactory hardening of the tip. Molybdenum high speed steels are suitable since they have a hardening range of 2150 to 2250 deg. F. or 170 to 270 deg. F. above the melting point of copper. By soaking the tip in this temperature range, allowing the copper to set by cooling in air, and finally quenching in oil, the tip will be in the hardened condition. This method has been named Braze-Hardening.

Braze-Hardening

Braze-hardening may be carried out in a commercial furnace designed for the copper brazing of carbide tips. At Watertown Arsenal an electric furnace provided with a semi-circular muffle made of heat resisting alloy is used. The furnace is designed to apply localized heat only to the portion of the tool to be brazed. A hydrogen atmosphere is maintained inside the muffle to prevent oxidation.

The procedure found satisfactory for tipping lathe tools with molybdenum high speed steel involves several steps. The joining surfaces of the unhardened tip and shank are first cleaned by immersion in carbon tetrachloride. The shank end is covered with a commercial powdered copper brazing flux and the tool is pushed partly into the muffle of the brazing furnace. When the flux has melted and spread over the surface, the shank is withdrawn from the muffle. The tip and shank are fitted together with strips of copper in between and on top of the tip and additional flux is applied. The assembled tool is then moved partly into the muffle in order to preheat the tips. When the tip has attained a temperature of approximately 1500 deg. F. the tipped end is moved into the high heat portion of the furnace operating at 2225 deg.

In coming up to this temperature, the melting point of the copper (1980 deg.) is exceeded and brazing occurs during which the copper on top of the tip melts and flows in between the tip and shank. After allowing the tip to soak for a suf-

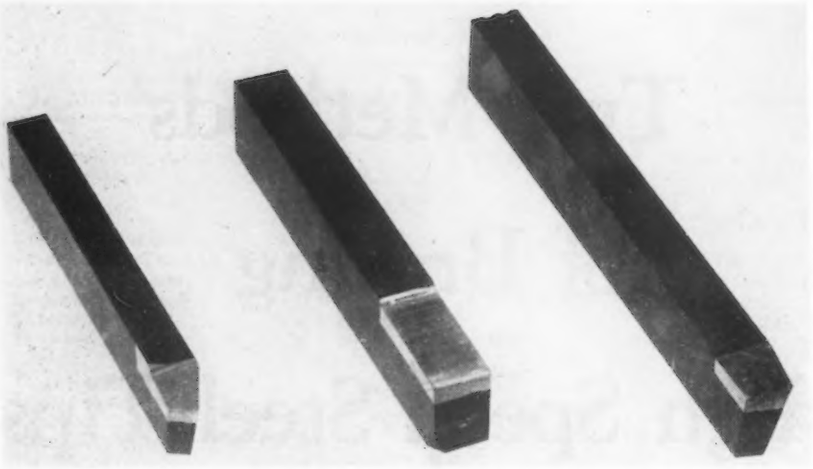


Fig. 1—Braze-hardened molybdenum high speed steel tipped tools.

ficient time at 2225 deg. to insure satisfactory hardening, the tool is withdrawn from the muffle and the tip is pressed firmly in place either by tongs or in a press in order to squeeze out any excess copper or flux. When the copper sets, the tipped end is quenched in oil to below 200 deg. This procedure takes less than 20 min. for each tool. It is then necessary to temper the tipped tool at 1050 deg., as is done with a hardened solid high speed steel tool, in order to develop secondary hardness.

Three molybdenum high speed steel tipped tools are shown in Fig. 1. The assembly used in copper brazing is illustrated in Fig. 2 for a tool 9 in. long, 1¼ in. high and ⅝ in. wide. Shank material is a silicon manganese steel of the chisel tool type. A folded copper strip of 0.01 in. total thickness is placed on the tip and a single strip 0.002 in. in thickness is placed between the tip and shank. After braze-hardening and tempering at 1050 deg. for 2 hr., a hardness survey was made on this tool, as shown in Fig. 3. The tip attained a uniform hardness of about Rockwell "C" 65. Hardening of the shank occurred for a distance of about 5 in. from the front of the tool.

Silver brazing can also be used to make high speed steel tipped tools, but the low melting point of commercial silver solder (about 1200 deg. F.) prohibits using the same procedure as with copper brazing. However, by using previously hardened tips, it is possible to braze the tip and temper it simultaneously. Since the melting point of silver solder is higher than the usual tempering temperature of high speed steel, it is imperative that very short brazing times be employed to avoid overtempering and consequent softening. Any high speed steel composition may be used as tips. However, high-carbon, high-vanadium high speed steel and cobalt high speed steel are particularly suited to this method since they have greater resistance to softening on tempering than the ordinary high speed steels. This method has been named Braze-Tempering.

Fig. 2—Assembly for copper brazing of high speed steel tip.

Braze-Tempering

In braze-tempering, the joining surfaces of the shank and hardened high speed steel tip are thoroughly cleaned and covered with a commercial silver brazing flux made in paste form. The tip is fitted on the shank with an intervening strip of silver solder 0.003 in. in thickness. The assembled end of the tool is then heated by playing the flame of an oxyacetylene torch along the bottom until the heat soaks through the shank and melts the silver solder. Care must be taken to avoid overtempering of the tip by minimizing the time between melting and solidification of the silver solder. During this time, the tip is pressed firmly in place.

When the silver solder sets, the tipped end of the tool is quenched in oil for a few seconds to drop the temperature of the tip below 1000 deg. where effective tempering ceases. The tool is removed from the oil and allowed to cool in air in order that transformation of the retained austenite present in the hardened high speed steel tip may occur more uniformly and with less danger of cracking the tip. The result of this procedure which takes about 15 min. for an ordinary size tool is that the tip is in the tempered condition and brazed firmly to the shank. A subsequent temper at 1050 deg. for one hour is recommended for the purpose of stress relief and will have practically no effect on the hardness of the tip.

The assembly used in braze-tempering is illustrated in Fig. 4. A hardness survey was made on a braze-tempered tipped tool having the same size as the tool illustrated in Fig. 3. As shown in Fig. 5, the tip retained its initial high hardness. The hardness of the shank was unaffected by braze-tempering except directly below the tip where the critical temperature was exceeded by direct contact with the oxyacetylene flame, and the subsequent oil quench (followed by an air cool) caused hardening.

In taking heavy roughing cuts, sufficient heat may be developed to

SILICON — MANGANESE TOOL STEEL SHANK

MOLYBDENUM HIGH SPEED STEEL TIP

17.0	16.5	16.5	15.5	16.0	16.5	17.5	16.5	29.5	42.0	45.5	47.5	46.5	46.5	65.5	65.0	65.5	65.0		
13.5	13.0	14.5	14.5	14.5	13.5	14.5	14.0	24.5	40.5	44.5	47.0	47.0	48.5	47.5	46.5	46.5	45.5		
13.5	14.5	14.0	14.0	14.5	14.0	16.5	16.0	23.5	39.0	44.0	46.5	46.5	48.5	47.0	47.0	46.5	45.5		
14.5	11.5	13.5	13.5	15.0	15.0	14.5	14.5	21.5	40.5	44.5	46.5	46.5	47.0	47.5	48.5	46.5	46.5		
16.5	16.0	16.5	16.5	15.5	18.5	17.0	17.0	24.5	40.5	43.5	45.5	45.0	48.0	46.5	47.5	45.5	45.5		

FIG. 3—Rockwell C hardness survey of *braze - hardened* molybdenum high speed steel tipped tool tempered for 2 hr. at 1050 deg. F.

cause softening of the silver alloy braze and consequent movement of the tip. For this reason, it is preferable to use braze-tempered tools mainly for finishing cuts. On the other hand, since copper softens at a much higher temperature than silver solder, braze-hardened tools can be used to take either roughing or finishing cuts. Another advantage of the braze-hardening method is that substantial hardening of the shank takes place, while in the case of the braze-tempering method the shank is relatively unhardened. This means that the braze-hardened tool shank is stronger and will have less tendency to take a permanent set due to bending in taking a heavy cut. In the case of braze-hardening, it is necessary that the shank steel possess resistance to excessive grain coarsening at the high temperature involved. This requirement is not necessary in the case of braze-tempering because of the lower temperature.

There are several advantages in using tools tipped with high speed steel by the two brazing methods. First in importance is the saving of high speed steel, the amount of which depends upon the design of the tool. For ordinary straight lathe tools which are reforged and rehardened until half of their original length is used up, the saving is estimated as 75 per cent, while for special shaped tools it may be as high as 99 per cent. This economy makes it possible to use special high speed steels such as high-carbon, high-vanadium, and the cobalt types which give superior performance to an ordinary high speed steel in certain applications. Although these special compositions contain relatively large percentages of strategic metals, their use in tipped tools is practical.

Conservation of high speed steel may also be accomplished by salvaging solid tools which have been discarded as undersize. These tools may be annealed and then cut up into appropriate tip sizes. This method of conservation is very important in the case of special high speed steel compositions which will become more and more difficult to obtain as time goes on.

Besides conservation of high speed steel, there are other advantages to the use of tipped tools by the brazing methods. Since only the tip is fully hardened, there is less danger of the tool cracking or harmful internal stresses being set up than in the case of hardening a solid tool, especially one having a complicated shape. Breakage of tools may also be avoided by the use of tough alloy steel shanks in tipped tools, particularly for those applications involving shock. Cutting efficiency will also be increased since it is easier to obtain full hardness in a tip than in a large solid tool. Likewise, using a tough shank, the tip can be used at a higher hardness than would be used in solid tools for applications involving shock. The cost of making

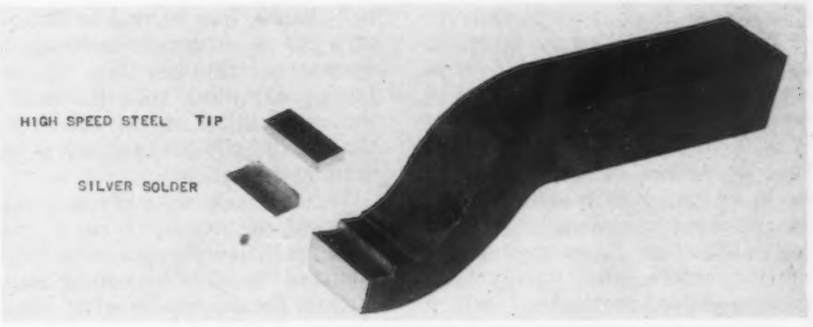


Fig. 4—Assembly for silver alloy brazing of high speed steel tip.

FIG. 5—Rockwell C hardness survey of *braze - hardened* high speed steel tipped tool.

SILICON — MANGANESE TOOL STEEL SHANK

HIGH SPEED STEEL TIP

8.5	12.0	15.0	13.5	16.5	16.0	15.0	14.5	16.0	16.5	16.0	14.5	14.5	16.0	64.5	65.0	65.5	65.0		
13.0	14.5	16.0	15.5	15.0	19.0	18.5	15.0	16.0	16.0	14.0	16.5	16.5	14.5	15.0	15.0	15.5	16.0		
13.5	14.0	16.5	15.5	15.0	15.0	12.5	16.0	16.0	18.0	17.5	15.5	15.5	17.5	23.0	20.5	16.5	17.5		
14.5	15.5	13.5	16.5	16.5	15.5	16.0	16.5	17.5	17.5	16.0	18.0	31.0	35.0	34.5	33.5	29.5	17.5		
13.0	13.5	14.5	14.5	17.5	15.0	16.0	16.0	13.5	14.0	18.5	29.5	48.5	42.5	43.5	44.0	43.5	38.0		

a tipped tool compares favorably with that of making a solid tool even without taking into account the saving in high speed steel.

Limited to Simple Tools

At Watertown Arsenal, both methods of brazing have proven successful and high speed steel tipped tools are being substituted for solid tools wherever possible. Thus far, these methods have been used mainly for lathe tools. The limiting factor in the application of these methods is the difficulty involved in brazing tips on complicated tools like drills or specially shaped cutters.

Various methods of making high speed steel tipped tools besides brazing are in use. These include mechanical fasteners, inserting, welding, and cementing. [Many of these methods are described in the reprint pamphlet. "How to Increase Cutting Tool Life," THE IRON AGE, price 35¢.] Some of these methods are comparatively new and their relative advantages have not yet been established. However, if these methods were adopted on a nation-wide scale, they would result in a considerable saving of strategic metals. In view of the present shortage of these metals, the adoption of high speed steel tipped tools wherever possible is considered a patriotic duty, besides offering definite economic advantages.

Small Furnace for Brazing Carbide Tips

THREE-SHIFT operations, seven days a week, at the Reliance Electric & Engineering Co., Cleveland, have put a premium on the availability at all times of a good supply of tungsten carbide tipped tools. Between 500 and 600 carbide tools a month are required as a minimum, many of them special tools to do special jobs, or to fit special purpose machines.

Until very recently, it was possible to get fairly prompt delivery of finished tools directly from the tool manufacturers. Carbide tips are still readily obtainable on 10 days to two weeks delivery. However, deliveries of finished tools have lengthened to as much as six weeks or longer. These longer deliveries have threatened to create real difficulties in production of electric motors, since it is not always possible, particularly where special tools are concerned, to anticipate requirements that far in advance.

For this reason and the fact that there was a large accumulation of old shanks around, Reliance decided to set up equipment to make its own carbide tipped tools.

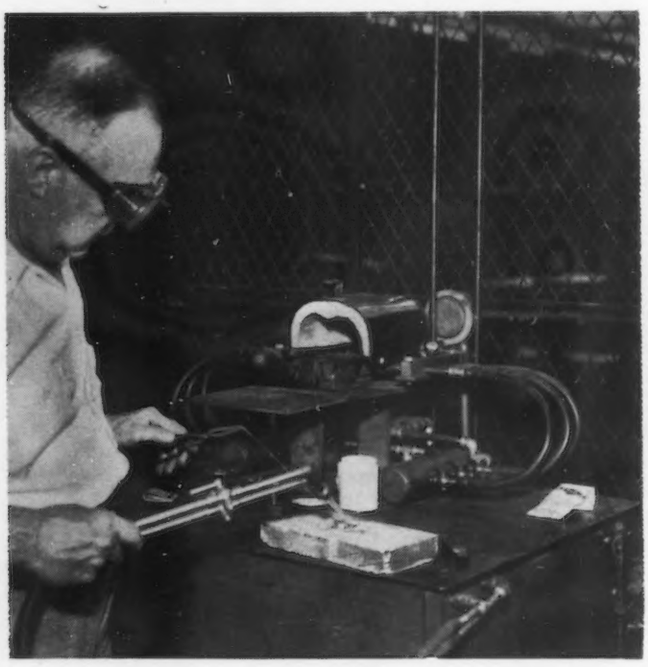
Shank sizes handled in the tool making program range from ¼ to 1¼ in. square. Worn ends are cut off in a power saw. The larger tool shanks, new as well as old, are then put on shapers to machine the necessary clearances for the tool faces. A milling machine handles the end milling of the recess for the carbide tip, preparatory to the brazing operation.

The only new piece of equipment required, a brazing furnace, was built by Reliance's own shop force. Mounted on a table height metal cabinet, the furnace consists essentially of six fish tail gas tips, three on each side of a furnace hearth which is provided with a hinged and heavily insulated hood. Natural gas, mixed with air in two manifolds, one for each set of three burners, produces such a hot flame that the largest tool shank can be heated cherry red in 1½ min.

In the brazing process, tool shanks and carbide tips are independently "tinned" with Easy Flo brazing alloy. The tips are heated with a hand torch which likewise uses natural gas as a fuel. A small hand vise has been provided for holding the tool shank during the brazing operation. It can be slid easily into and out of the furnace enclosure, thus leaving the operator free to perform the tinning of the carbide tip while the tool shank is being heated. Both tool shanks and tips are cleaned by dipping in carbon tetrachloride before flux or brazing alloy is applied.

As soon as the tool shank has reached a cherry red temperature the recess to receive the tip is also "tinned." The carbide tip is then dropped into place, a small amount of brazing alloy distributed along the meeting edges of tip and shank to insure a good contact, and the assembly returned to the furnace to be brought up to an even brazing temperature of about 1400 deg. F. The operator then removes the tool from the flame, but allows it to remain in the vise until the brazing material has solidified. This occurs at about 1175 deg. F. The tool is then removed from the vise, and allowed to slowly cool in a steel pan filled with powdered lime.

It is estimated that the total time for making a finished tool, including machining as well as brazing operations, will not exceed 20 min. for a ¾ in. tool bit.



o o o

THIS small gas fired furnace, designed and built on the premises, has performed very satisfactorily in brazing carbide tips at the plant of the Reliance Electric & Engineering Co. Hundreds of old tools accumulated over a period of years have been reclaimed and put back into service.

o o o

High Frequency Flows Electrolytic Tin Plate

HIGH frequency heating at 200,000 cycles per sec. to melt (flows, or fuse) tin electrolytically deposited on a steel sheet is showing promise of saving critical tin, speeding production, and facilitating the mechanical handling of the plated sheet. Already at work in one steel mill (60 tons per day on 14-in. strip), this latest result of electronic research flows 12 sq. ft. of tin in 0.7 sec.

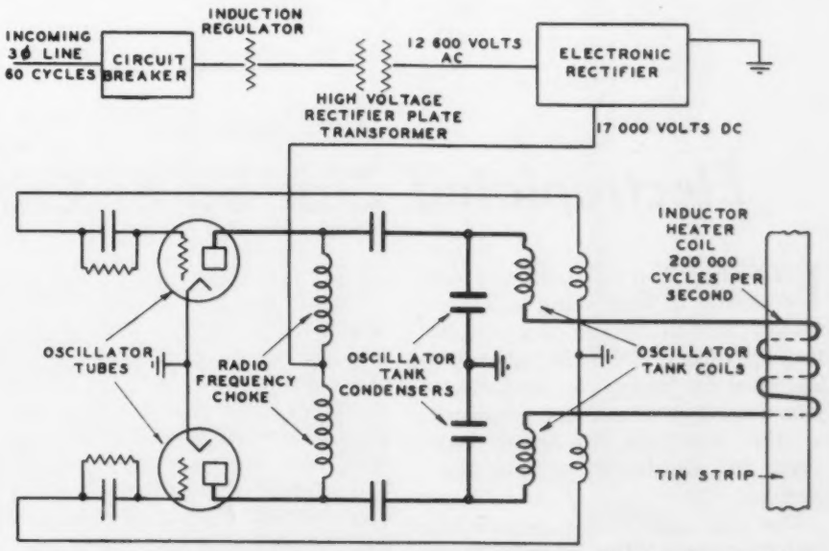
Considerable saving in both tin and steel sheet may be realized by high-frequency heating, since no waste is encountered from scoring or from marking the sheet by either electrical or mechanical action. In the induction system it is possible to melt and quench the tin plate between guide rolls. As the power input to the inductor coil, which determines the amount of heat generated, can be immediately and automatically adjusted to correspond with any change in speed of the strip, the proper temperature to melt the tin is maintained and danger of oxidizing of the strip eliminated.

High-frequency heating equipment is being designed to operate at speeds up to 1000 ft. per min. At present electrolytic plating is operated in the neighborhood of 500 ft. per min., but in the near future this speed will be doubled and full advantage made of the high-speed operation of induction heating.

Great care must be used in handling the tinned strip as the tin is a very soft material and is easily scratched. The rehandling problem is avoided with induction heating as sufficient power can be generated in the sheet to heat the strip to the fusion point of tin, immediately after it passes from the plating tank. Within 0.7 sec. after the strip enters the coil, the temperature is brought up to 450 deg. F, where the tin melts and starts to flow into a smooth, even surface. Only a few feet of line travel is required to produce sufficient heat when the strip is passing through the inductor coil at 1000 ft. per min. This flowing operation becomes an integral part of the tinning line, instead of a separate operation requiring an additional handling of the strip.

With induction heating, the power input may be adjusted rapidly to accommodate changes in the speed of the line, as during periods of acceleration or deceleration when two coils are welded end to end. A speed change simply means a corresponding change in the power input to the heater coil.

The frequency at which the required current can be induced in



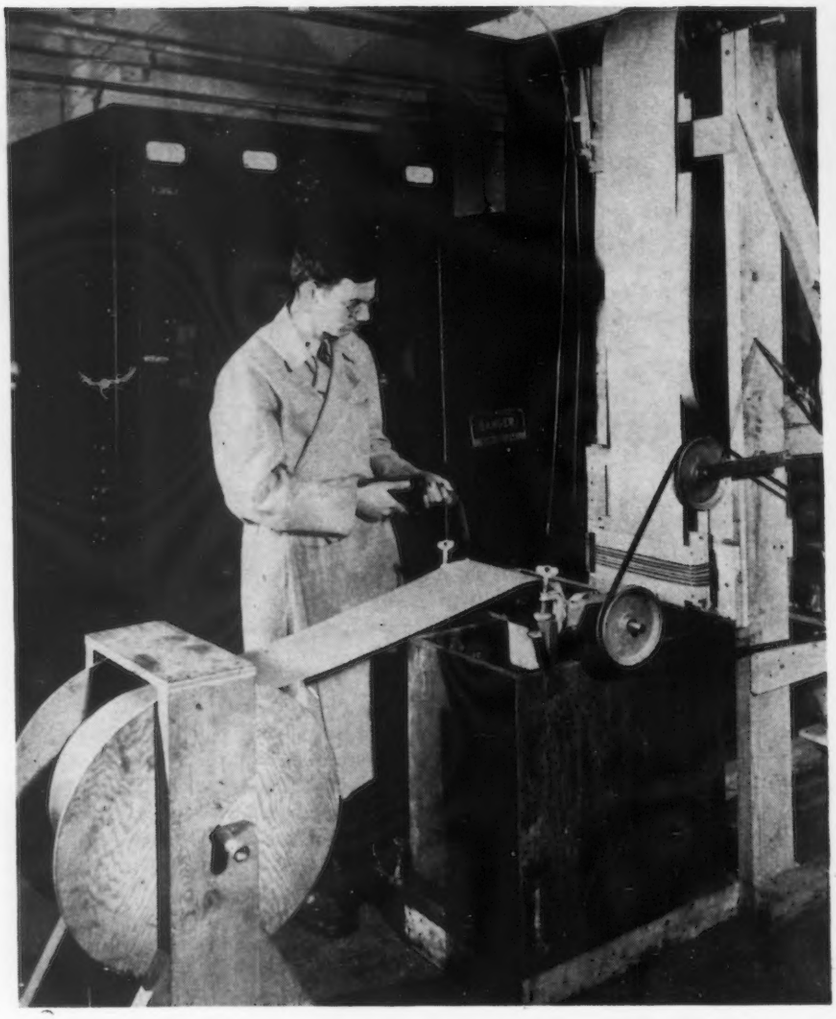
A.C. current is converted to d.c. by high voltage rectifier plate transformer and an electronic rectifier. The d.c. power applied to the plates of a bank of 3600-kw. vacuum tube oscillators is converted into high frequency a.c. power of 200,000 cycles per sec. Water cooled copper tubes conduct this high frequency power to the inductor heater coil which surrounds the tin coated steel strip.

the strip without using abnormally high voltages depends upon the thickness of the sheet. Since tinplate usually is of the order of 0.008 in. to 0.011 in., a frequency of approximately 200,000 cycles per sec. is most practical for this thickness of sheet.

The inductor heater coil is rectangular in form, wound as close to the strip as mechanically possible. It acts as the primary of a transformer while the strip itself constitutes a single turn secondary. The induced current flows across the strip paralleling the turns of the inductor heater coil. The heat generated in the strip is due to the resistance of the strip and the current flowing through it.

The power is supplied by vacuum tube oscillators, which are essentially the same as the transmitter of a radio station. Sixty cycle alternating current is rectified to direct current and fed to the oscillator tubes where it is converted to 200,000 cycles per sec. and sent out through the inductor heater coil. One plant is installing tin flowing oscillator units with 72 times the power of the most powerful radio broadcasting station in the United States.

About 30 electrolytic tin plate lines are operated or being built in the United States, and the bulk of the tin plates from these lines will be fused, flowed, or melted by one means or another. The Westinghouse Radio Works, Baltimore, already has on order 8500 kw. of these 200,000-cycle heating units to service some of the lines.



THIS pilot mill is the latest result of Westinghouse's Baltimore Radio Division. This pilot mill is small and crude but ably demonstrates how 10 ft. of copper tubing in a coil can fuse the tin quickly and efficiently. The strip is passing vertically downward, through the coil, thence into a quench tank, through a small drive roll, and finally onto a reel (left foreground).

Electroplated Zinc Saves Critical Materials

ELECTROPLATED zinc on steel sheets is furnishing a satisfactory substitute for pure nickel, tin, chromium, aluminum or stainless steel for many war production jobs according to an announcement of the American Nickeloid Co., Peru, Ill., developers of this new product.

The zinc plated sheet is new in that pure zinc applied by an electroplating process to steel sheets has not been widely commercialized before. However, in many ways it resembles the product of the galvanizing process.

It is said for the new product that the thickness and uniformity of coating can be controlled within fine limits and that the zinc provides a protective coating for the steel sheet which in highly resistant to corrosion and rusting. In addition to this protective coating, a galvanic action which takes place between the zinc coating and the base metal is claimed to impart additional corrosion resistance to the steel.

Full workability of the zinc coated sheet lends the product to all types of fabrication without the problems of plating after fabrication. The coated sheet is said to perform satisfactorily in bending, stamping, forming, or drawing operations and can be soldered or spot welded readily. Likewise, even under such production operations the plating is said not to crack or flake. At the present time the zinc plated product is available only in sheet form.

Continuous Treating Furnace for Shells

CONTINUOUS pusher type roller rail furnaces are being successfully applied to heat treating 75-mm., 90-mm, 105-mm. and 8-in. shells. Several furnaces of this type, giving a production of 200 to 40 shells per hr., have recently been installed by the Mahr Mfg. Co., Minneapolis.

Many construction features of the Mahr shell furnaces have been adopted from units built in the past by the company for the treatment of tool joints used in well drilling. The shell furnaces are built to handle from 2 to 12 rows of shells per furnace and can be arranged to handle armor piercing shot. A typical layout to handle heat treating, quenching and drawing operations automatically is shown in Fig. 1. Fig. 2 is the entering end of the furnace, showing the pusher equipment.

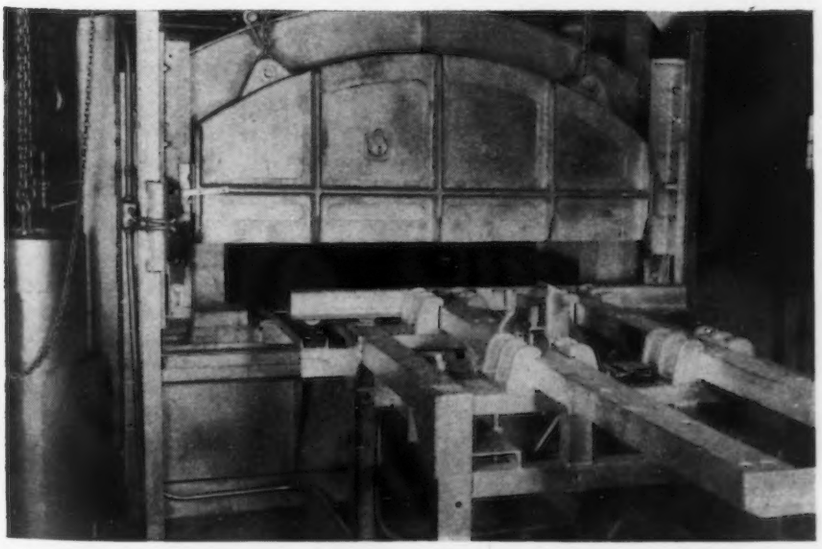
The shells, which are loaded butt to nose, progress through the furnace by the movement of the pusher. This movement can be set at any time interval and will repeat automatically. The pusher is also synchronized with the quench system and the conveyor type draw furnace. This arrangement eliminates all manual handling of the projectiles, except that required to load the shells into the furnace.

When treating high explosive and other types of open nose shells, which have the thickest section at the butt, the thick section enters the quench first. As the shell enters the quench oil, it is stopped momentarily under the surface and jets of oil under pressure are forced into the cavity, to eliminate the possibility of air or gas pockets forming there and preventing complete quenching. These shells are automatically carried from the quench, with the nose end down to permit thorough draining, to the apron of the draw furnace conveyor.

The hardening furnace is direct fired, burners firing from both sides, over and under the charge. The draw furnace is heated by convection, the hot gases being circulated through the furnace, drawn off for reheating and then recirculated.

Furnaces for armor piercing shot are quite similar to the above except that the timing must be set to give a longer heating cycle in both hardening and drawing. Another difference is that in the discharge of the shells from the hardening furnace to the quench, the chutes for AP shot must be designed to drop the projectiles into the quench medium nose down in a vertical position. The nose is then flooded with oil from spray jets and in this position the shot is deposited onto a conveyor.

FIG. 2—Entering end of the heat treating furnace, showing the pusher equipment and roller rails.



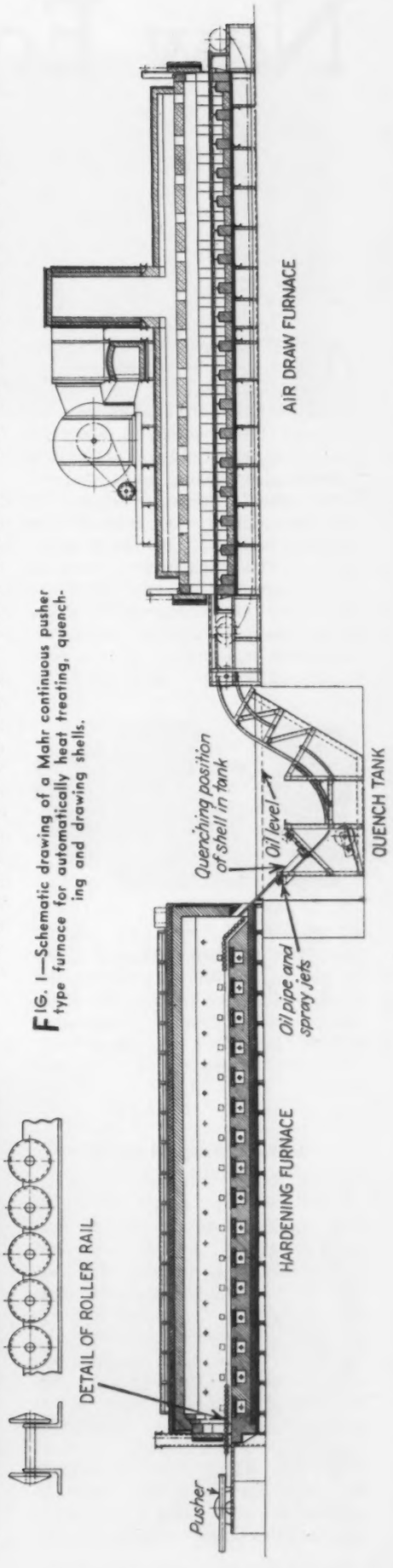


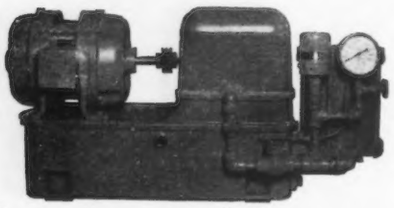
FIG. 1—Schematic drawing of a Mahr continuous pusher type furnace for automatically heat treating, quenching and drawing shells.

New Equipment . . .

Machine Tools

New designs and improvements in tool room and production equipment are described in this second section devoted to machine tools.

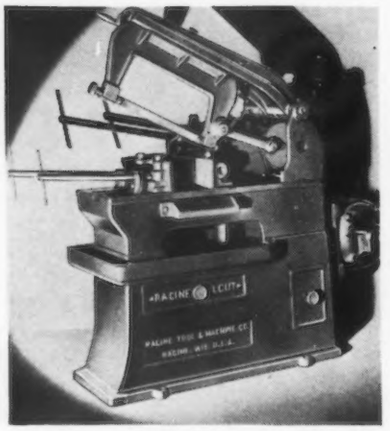
A NEW Model 5036 hydraulic power unit, particularly designed and developed for hydraulic chucking installations, has been announced by *Logansport Machine, Inc.*, Logansport, Ind. This unit is capable of operating additional cylinders for tailstock or similar requirements and also sustains the pressure during the different executions of the work cycle. A spring loaded accumulator permits maintaining of this pressure without the electric motor running constantly. A built-in pressure switch of a non-diaphragm type automatically shuts



off the electric motor when the accumulator has been charged to 550 lb. per sq. in. When the accumulator has discharged sufficient oil to reduce the hydraulic pressure to 450 lb. the switch will again start the motor. Pump delivery is 8 gal. per min.

Metal Cutting Machine

THE Racine "Oil-Cut" hydraulic 6 x 6 in. high speed metal cutting machine built by *Racine Tool & Machine Co.*, Racine, Wis., has been redesigned and improved. Two cast alloy iron gibs eliminate bearing surfaces in the guide by carrying sliding movement of the frame on all surfaces. Gibs are replaceable and one is adjustable for bearing take-up. The saw frame is also a ribbed T-section to withstand maximum blade tension without distortion. The connecting rod pin has been lowered in the frame to prevent chattering and a new clutch has been developed with two fingers



giving maximum clutch surface grip and minimum pressure on the cone. Clutch pressure is adjusted with a pressure dial on the side of the hydraulic unit. New front jaws have been added for positive grip of the material being cut. Automatic stock feeding equipment is also available. Three speed sliding gear transmission is built in providing speeds of 70, 100 and 140 strokes per min. This unit has a 5 in. stroke and a rated capacity of 6 x 6 in.

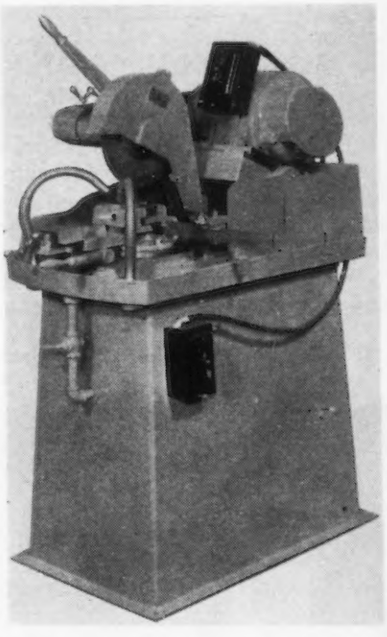
Power Hack Saw

THE SALES SERVICE & MFG. CO., 473 N. Cleveland Avenue, St. Paul, Minn., announces the new Hy-Duty Keller power saw, furnished with a cabinet base,

built-in coolant tank, and pump in the base of the saw. A handwheel on the front of the base gives desired pressure required for work. Two cutting speeds are supplied. Capacity of the saw is 6¾ x 6¾ in. straight and 4 x 4 in. at a 45 deg. angle. The saw is powered by a ½-hp. motor and has an automatic stop switch to stop the motor when the cut is completed.

Abrasive Cut-Off Machine

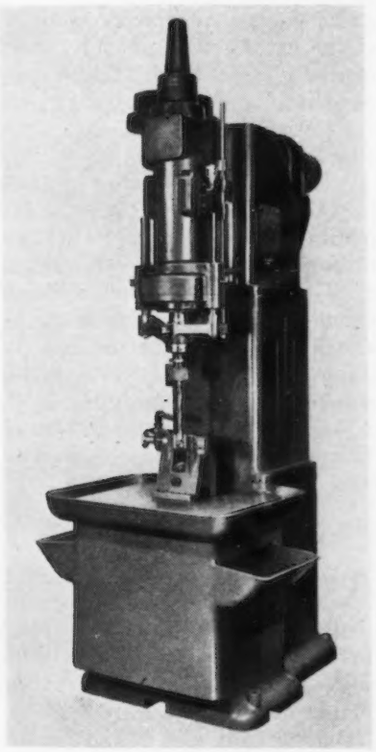
A. P. DE SANNO & SON, Phoenixville, Pa., has introduced the Radiac type N abrasive wet cut-off machine for cutting off



bars, tubing and formed shapes. It uses stubs of larger abrasive disks from larger Radiac or other cut-off machines. The coolant is directed into the wheel and work at the point of cutting. Two types of vises may be supplied—a straight vise for straight cuts only or a swivel vise for straight or angle cuts up to 45 deg. The machine has a patented hand-operated vise and non-tiring handle.

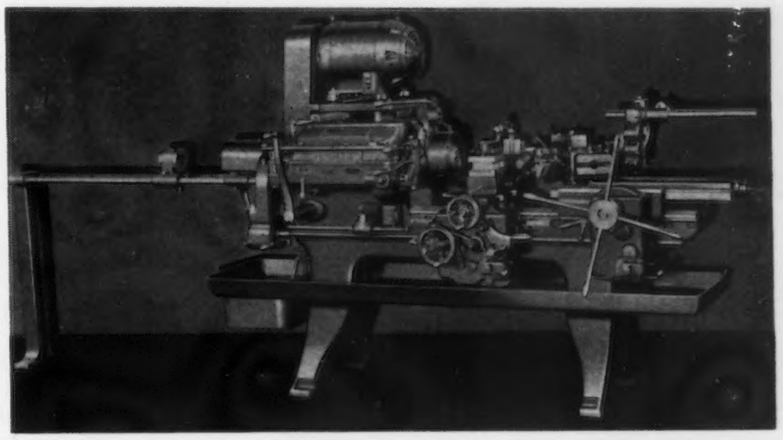
Precision Tapping Machines

DETROIT TAP & TOOL CO., 8432 Butler Street, Detroit, has announced a new line of special high-production precision tapping machines. The machines may be provided with either single or multiple tapping heads, and may be used for oil grooving or long lead tapping. The line of machines is featured by the use of a lead screw to assure accuracy without requiring the lead screw to drive the tap. This is achieved by driving the tapping spindle at a point between



the tap and the lead-screw itself. Thus inaccuracies due to lead-screw "wind-up" are avoided. The machines are also designed so that the lower end of the tapping spindle is guided through the entire stroke. The light duty (series LTM) machine is designed for tapping up to ⅞ in. and 14 pitch in steel. It is provided with a 4 in. steel column on which is mounted the motorized tapping head. Height adjustment is by rack and pinion. Maximum stroke of the machine is 6 in. Adjustable trip dogs and limit switches provide automatic operation. The heads may also be swiveled horizontally through an arc of 90 deg. to permit tapping in various positions in the fixture. Three spindle speeds are provided.

The heavy duty tapping machine



(series HTM) illustrated, is provided with pick-off change gears between the spindle and the Cone-drive gear first reduction.

Bomb Marking Machine

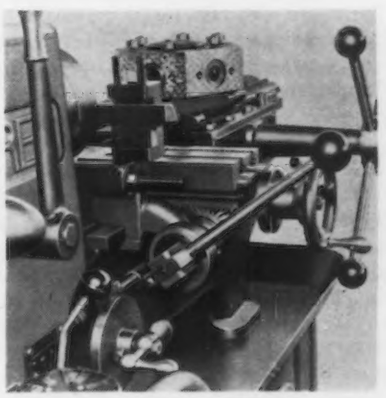
A SEMI-AUTOMATIC machine made in various sizes for marking 100 to 1000 lb. bombs has been introduced by *James H. Matthews & Co.*, Pittsburgh. To operate, a bomb is rolled into the machine in the position shown, resting on the cradle rolls. It is held in position by a pneumatic thrust chuck at the nose and by a rotating thrust bearing at the tail. To mark bombs, a single revolution clutch is tripped by a hand lever. A roller die with interchangeable type rotates the bomb and progressively marks the required data, in one line of ¼ in. characters on the conical tail surface. The bomb is then raised from the cradle rolls and allowed to roll from the machine.

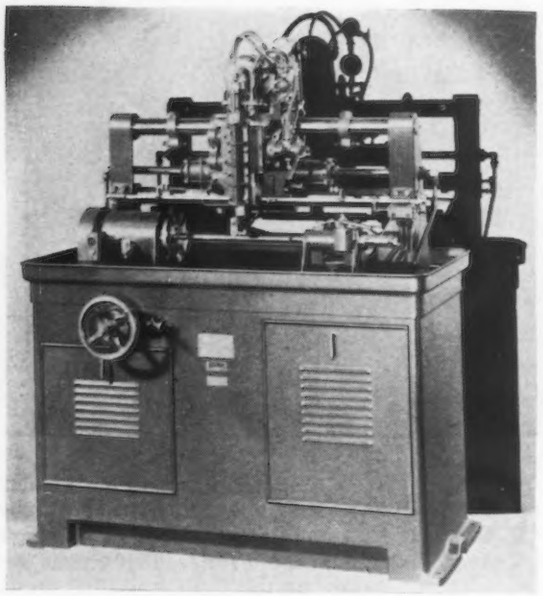
Ram Type Turret Lathe

THE INTERNATIONAL MACHINE TOOL CORP., Foster Division, Elkhart, Ind., announces a universal ram type turret lathe with collet chuck capacity of 2 in. diameter and 17½ in. swing over ways. The machine is supplied with tools for both bar work and chucking work and will accommodate 8, 10 and 12 in. diameter chucks. Double V-ways of semi-steel are readily replaceable. Spindle control is provided by a lever on top of the headstock which controls the double multiple disk clutch on the main drive shaft. A second lever controls forward and reverse spindle rotation. The all-geared headstock provides eight spindle speeds. Power from the motor is transmitted by multiple V-belts. Motors of 3, 5 and 7½ hp. are regularly furnished. For standard speed range 1200 r.p.m. motors are used; for the high spindle speed range, 1800 r.p.m. All gears in the headstock transmission are heat treated alloy steel, have helical teeth and are finished by the shaving process. The spindle is mounted on widely spaced precision type tapered roller bearings. All other shafts in the headstock are mounted on ball bearings. The universal carriage is provided with six reversible cross and longitudinal feeds which operate independent of the hexagon turret carriage.

Turret Lathe

MOREY MACHINERY CO., Inc., 410 Broome Street, New York City, announces a recent development of their No. 2G turret lathe. It is an improved quick acting combination screw and rack lever cross slide. This enables the operator immediately to use either type of feed, or the screw feed in combination with the lever feed. He can, by one movement of a quick-acting clutch, select either the lever movement to the cross slide, or the screw movement, as his work requires. No set-screws for tightening or loosening are employed.



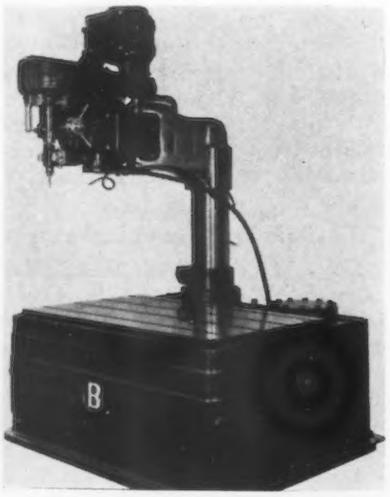


Radial Tapping Machine

THE BAKEWELL MFG. CO., 2427-35 E. 14th St., Los Angeles, Calif., announces a new radial tapping machine that makes possible tapping of work to a class 3 and 4 fit on a production basis. Lead screw control is gained by the hobbing of threads in the brass guide fingers which take the place of the old fashioned nut. A sensitive clutch stops the tapping operation when the tap becomes dull or strikes chips or other obstructions in a bottoming hole. Depth control adjusts the tapping stroke to 0.005 in. The tapping head is mounted on a free floating radial arm which glides into tapping position with the slightest pull or push on the handle. The head and arm are raised and lowered hydraulically and can be swung for work mounted on T-slotted work surfaces on both the end and rear of the base. The machine has a capacity of No. 4-40 to $\frac{5}{8}$ in. in steel.

Superfinishing Machine

RECENT improvements have been made on the Foster 4 x 18 in. general purpose Superfinishing machine, and a new 4 x 36 in. model has been added to the line of machines offered by the Foster Division, *International Machine Tool Corp.*, Elkhart, Ind. The machines are capable of developing an extremely accurate and fine finish of 2-5 micro-in. on cylindrical work. They are arranged with a manually controlled variable-speed drive to the spindle, and a variable-speed drive to the oscillating head. The oscillating head is also provided with a longitudinal hydraulic traverse, speed of which may be varied from 0 to 30 in. per min. An enclosed ball bearing motor drives a variable speed pulley drive system, and provides an unlimited number of spindle speeds ranging from 25 to 690 r.p.m. Speed changes are controlled by a large handwheel and indicator dial located on the front of the machine. The oscillating head, which is mounted on two rigid guide bars, is arranged with an off-center drive, which provides an oscillating longitudinal traverse of approximately 3/16 in. The stone-holding unit is arranged with a spring pressure mechanism, the proper tension of which is maintained by the oil pressure in the hydraulic cylinder. A variable speed V-belt drive gives a wide range of oscillations to the superfinishing head. A controlled amount of cutting fluid is supplied to the cutting surface of the stone.



Tube Cutting Device for Nibblers

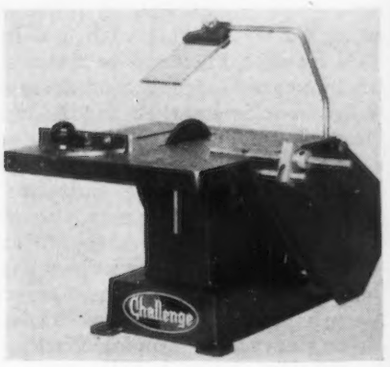
ANDREW C. CAMPBELL DIVISION of American Chain & Cable Co., Bridgeport, Conn., has introduced a tube cutting attachment which can be adapted to all sizes of Campbell nibblers. The operator places a template around the tube and then feeds the tube into the machine over the arbor which contains the die. Cutting speed is about 36 in. a minute. A wide range of materials, including stainless steel and aluminum alloys, can be nibbled quickly and inexpensivly.

Angular Head Grinding Machine

THE Fitchburg Type C angular head grinding machine, made by *Fitchburg Grinding Machine Corp.*, Fitchburg, Mass., is another application of the Fitchburg standard "Bowgage" wheelhead unit. It is designed to handle a wide range and a number of types of jobs. This plain cylindrical grinder has a standard wheelhead unit mounted so that it may be located to grind from 0 deg. up to a 45-deg. angle. The Bowgage head on the machine is adjustable and can be swiveled to various positions for standard plain grinding. The head goes through a completely automatic cycle—rapid traverse to work, feed, grinding dwell and rapid return. The workhead can be equipped for single or variable work speeds. Maximum swing over table is $8\frac{3}{4}$ in. and maximum distance between centers is 32 in. Work speeds range from 64 to 327 r.p.m.

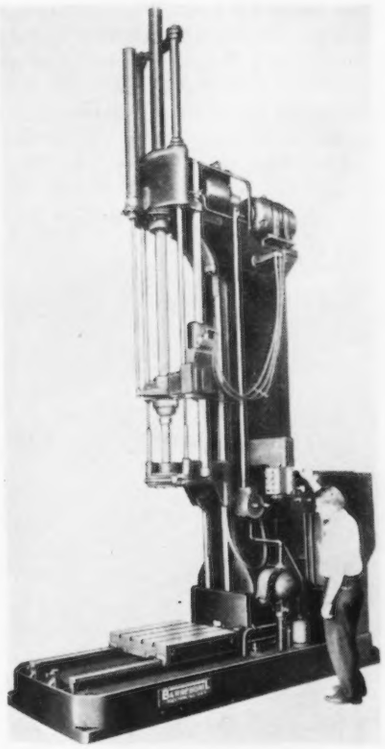
Abrasive Cut-Off Machine

AN abrasive cut-off machine is being manufactured by the *Challenge Machinery Co.*, Grand Haven, Mich., to handle any metal, hard or soft, tubular or solid, including hardened tool steel. It has a capacity up to 1 in. round and has an adjustable table, 15 x 14 in. It is equipped with an elastic bonded cut-off wheel and an adjustable safety guard above the wheel to protect the operator's eyes. The belt on the side is also guarded. A ball bearing type spindle is used.



Vertical Honing Machine

BARNES DRILL CO., Rockford, Ill., has announced a new size and design of a large vertical honing machine known as No. 4014. The machine has a 40-in. swing and hones cylinders up to 14 in. in diameter. The 3-in. 10-



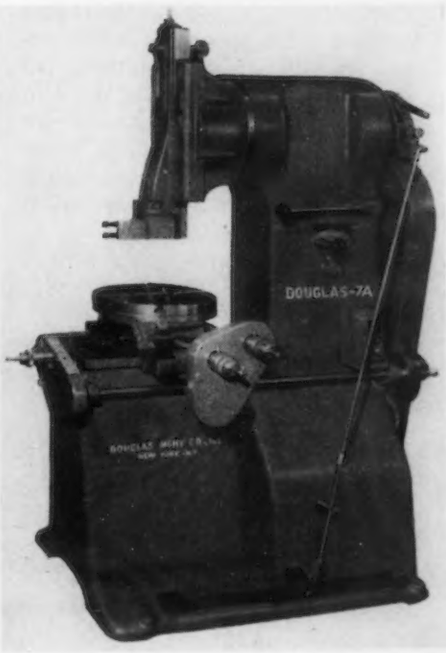
splined spindle has three standard spindle travels of either 35, 50 or 65 in. Yoke connection to spindle permits attaching multiple heads when desired. Two direct connected motors are used, one for the hydraulic system and the other for spindle drive. The rapidity of reciprocating cycles may be changed to suit the job by means of a volume regulator control mounted at the side of the column.

Rotary Milling Machine

A ROTARY milling machine has been designed and built by *Snyder Tool & Engineering Co.*, Detroit, for milling an undercut in the circular shoulder section of a turned propeller shaft hub to produce six elevated rest pads. The entire processing operation is fully automatic except for the throwing of a lever between first and second cycles. With the workpiece loaded and clamped in position hydraulically, an entire fixture assembly moves automatically by hydraulic power into milling position. A transverse sub-slide then automatically brings the workpiece into contact with the tools and feeds it forward to depth. The piece is then automatically rotated through the cutting arc. The machine is equipped with three milling spindles. On completion of the cuts, the fixture automatically retracts and rotates the workpiece 180 deg., into position for the second three cuts which complete the roughing operation. The finish cut is made in an identical second cycle after fixture has been retracted to permit inspection of finish.

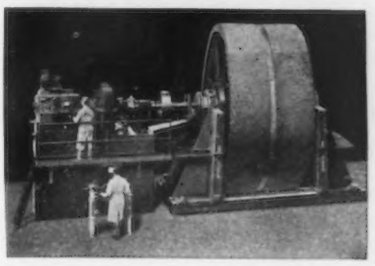
Vertical Slotter

AN automatic circular table with independent automatic feeds in all directions, accurate operation of ram brake and easily adjustable stroke are some of the features which make the Douglas slotter, manufactured by *Douglas Machinery Co., Inc.*, 150 Broadway, New York, adaptable to both tool room and production work. The head swivels 15 deg. to either side from the vertical. The machine is made in three sizes with maximum lengths of strokes of 7½, 8½ and 10 in., respectively. It is possible to provide the machine with a non-repeating clutch similar to those used on power presses. With this device, the ram will make a single stroke and stop. By releasing the binder and adjusting the ram by means of the vertical screw, the position of the ram in relation to the work height may be altered independently from the driving mechanism. Tools with either round, square or rectangular shafts may be used with the toolholder. Both hand and power feeds to all table motions — rotary, longitudinal and transverse—are provided. These feeds are variable and reversible and operated through jaw-clutches and ratchet feed.



Dynetric Balance Machine

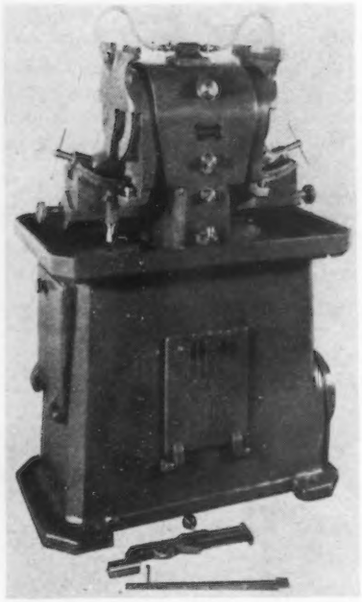
TO meet wartime production requirements, *Gisholt Machine Co.*, Madison, Wis., has broadened the overall range of the dynetric balancing machine line to extremes of 1 oz. and 50 tons. The new floor



type dynetric balancing machine is built to balance parts up to 100,000 lb. in weight, 240 in. in length, with 200 in. swing, such as the marine gear illustrated. The type S dynetric has been perfected to balance parts weighing as little as 1 oz.

Tool Bit Grinder

EXACT duplication of form on single point convex lathe tools up to ¾ in. square is provided by the template tool bit grinder made by the *Oliver Instrument Co.*, Adrian, Mich. Special holders are used which are rocked about a ball pivot mounted on the lower portion of a wheel guard or hood which can be adjusted axially to compensate for wheel wear. A flat steel template is first ground by rocking a master tool shape against a fixed pad on the hood. Then the holder for production tools is pivoted in the socket and the cam plate, now mounted at the top, is rocked against a straight edge at the top of the guard, thus generating the shape of the original master. Provision is made for locating the tool in the holder so as to remove a predetermined amount of stock. This type of set-up ordinarily gives equal clearance angles on all sides of the tool, although variable angles can be generated also. Clearance is adjusted by varying the angle of the hood through a screw and protractor sector. A third pivoted arm carries a diamond dresser for squaring



up the face of the wheel. The machine is shown with the tool holder on the floor in front of the unit.

Facing and Centering Machine

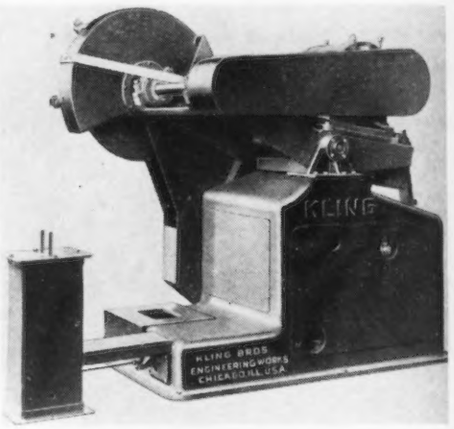
A HEAVY duty, double end facing and centering machine has been developed by *Snyder Tool & Engineering Co.*, Detroit, in standard sizes that will take work length ranging from 12 to 20 in.; 20 to 28 in.; 28 to 36 in. and 36 to 44 in. It consists of two units, each equipped for milling and centering, and is worm wheel driven and mounted on Timken roller bearings. The centering spindle is of quill type construction and has hydraulic feed. Cutter range for milling is 3 to 8 in. and center drills may range from 5/16 to ¾ in. The part is located and clamped into the fixture and the fixture and slide move in rapid traverse away from the operator, feeding the work between the two milling cutters. When the work piece is faced to length, the slide returns to the original loading position. The centering tools are then fed into the work and the return of these tools to starting position completes the cycle. The welded steel base of the machine encloses the hydraulic equipment, piping, etc., and adjustable trip-dogs.

Fluid Power Pumps

AMERICAN ENGINEERING CO., Philadelphia, Pa., announces completion of a standardization program on 16 series of their Hele-Shaw fluid power pump. Standardization affects pumps in both the low pressure and high pressure ranges, including pump capacities of 0.25, 0.4, 0.75, 1.5, 3, 6, 9, 12 and 18 cu. in. per rev. in the high pressure series; 0.25, 0.4, 1.5, 4, 7, 12 and 18 in the low pressure series. Aside from the general improvement in deliveries and increase in pump production, standardization will enable users to simplify their layouts and speed up production and servicing of Hele-Shaw fluid power operated equipment.

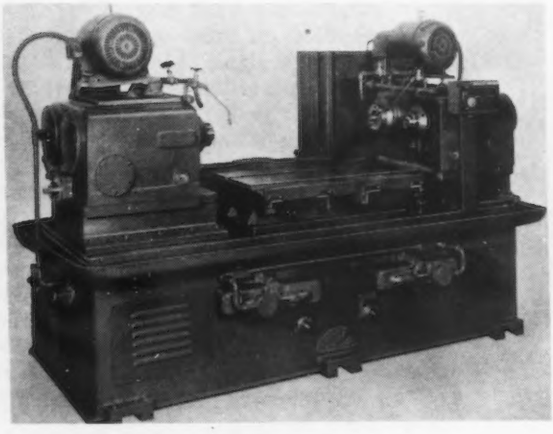
100-Hp. Shell Lathe

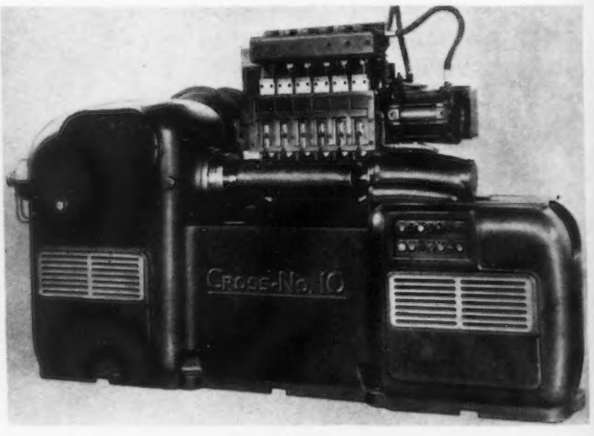
THE CROSS GEAR & MACHINE CO., 3250 Bellevue Ave., Detroit, announces a new shell lathe, known as the No. 10. Multiple carbide tooling is used to its fullest advantage by combining capacity for 100 hp. and rigid tool support with hydraulic tool feed and smooth spindle rotation. All cutting forces are directed down to the bed of the lathe so that there is no tendency to lift tools away from their support. Tool thrust is transferred directly to hydraulic cylinders. The overhead tool carriage provides tools with rigid support close to the cutting edge and allows chips to fall clear. Forces are downward on the rear tool slide because the normal direction of spindle rotation is reversed. Cone worm spindle drive with several over-lapping gear teeth minimizes wear. Hydraulic rapid traverse moves the tailstock on hardened and ground steel ways that are automatically lubricated. The motor is coupled directly with the clutch shaft to eliminate belts.



Downstroke Friction Saws

TO meet the demand for high speed friction saws for speed production of bombs, shells and bullets from solid or hollow, hot or cold steel stock, *Kling Bros. Engineering Works*, 1300 N. Kostner Ave., Chicago, announce a 36 and 48 in. downstroke friction saw with hydraulic feed and main motor sizes of 40 to 75 hp. Swing frame is actuated by means of a double-acting hydraulic cylinder through a 1½-hp. motor and pump which delivers oil at constant pressure during the cut and at low pressure

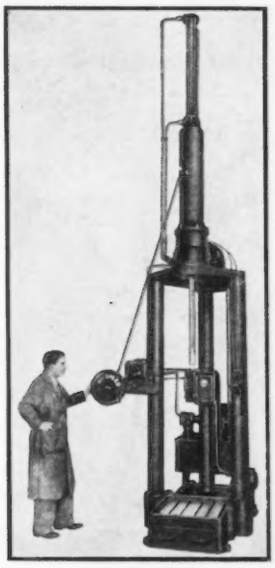




while idling between cuts. The operating pressure is adjustable to provide the desired operating load on the main motor which remains uniform during the entire cut. Rate of downstroke is adjustable up to 2.8 in. per sec. while upstroke is fixed at 4.34 in. per sec. The blade is shielded and a cooling system is provided.

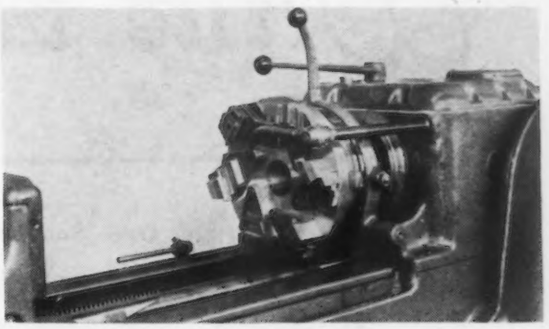
Honing and Lapping Machine

INTERNAL cylindrical surfaces with bores up to 24 in. in diameter and with any stroke from 20 to 72 in. can be honed with the Hi-Speed honing and lapping machine manufactured by the *Automotive Maintenance Machinery Co.*, 2100 Commonwealth Avenue, North Chicago. The machine can be adapted for either straight line lapping or co-directional honing. Design provides ample space for large cylinders to be placed on standard base. Variations in stroke or height under the spindle nose are easily taken care of. All controls are located at the front of the machine at the operator's station. Positive stop and dwell system makes it possible to stop the spindle at the bottom of each stroke or at any point within the stroke range without any shock to the machine or work being honed, and hold the spindle at that point up to 1½ min. This machine is made in four sizes, any of which can be had with strokes up to 72 in.



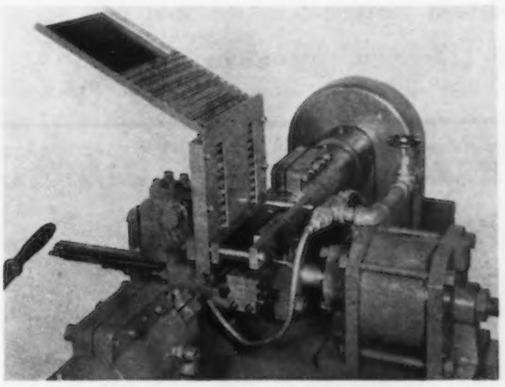
Die Head

A SPECIAL Lanco die head, known as type RXX, has been introduced by the *Landis Machine Co.*, Waynesboro, Pa. It has an exceptionally wide range coverage obtained by using an oversize closing ring on the face of the die head to support extended chaser holders. The die head illustrated is equipped with chasers for threading 9¾ in. diameter—8 pitch. By employing chaser holders with a still greater offset seating surface for the chasers, diameters as large as 12 in. can be handled. This die head is especially suitable for threading large diameter, fine pitch threads where the thread length is relatively short.



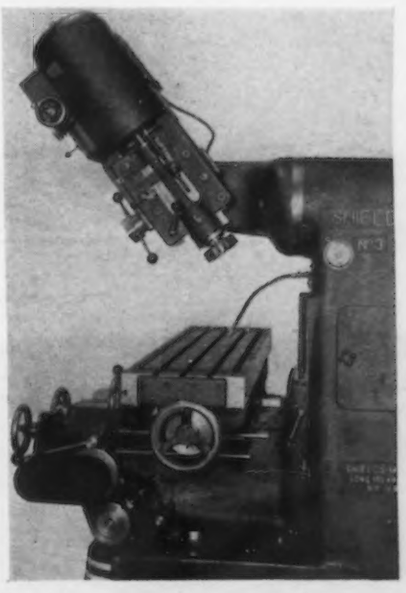
Automatic Feed for Profiling Machine

PINES ENGINEERING CO., INC., Aurora, Ill., announces the addition of an automatic chute feed to the air chuck on its two-spindle profiling machine. This attachment is being used for feeding such items as brass and copper primer tubes for boring and tapping operations on both ends at the same time. Production from these machines has been increased as much as 30 per cent by the addition of this automatic feed. Pines profilers are being employed for burring, chamfering, facing, threading centering, reaming and boring both ends of tubes or rods simultaneously. Several of these profiling operations may be combined and performed at the same time.



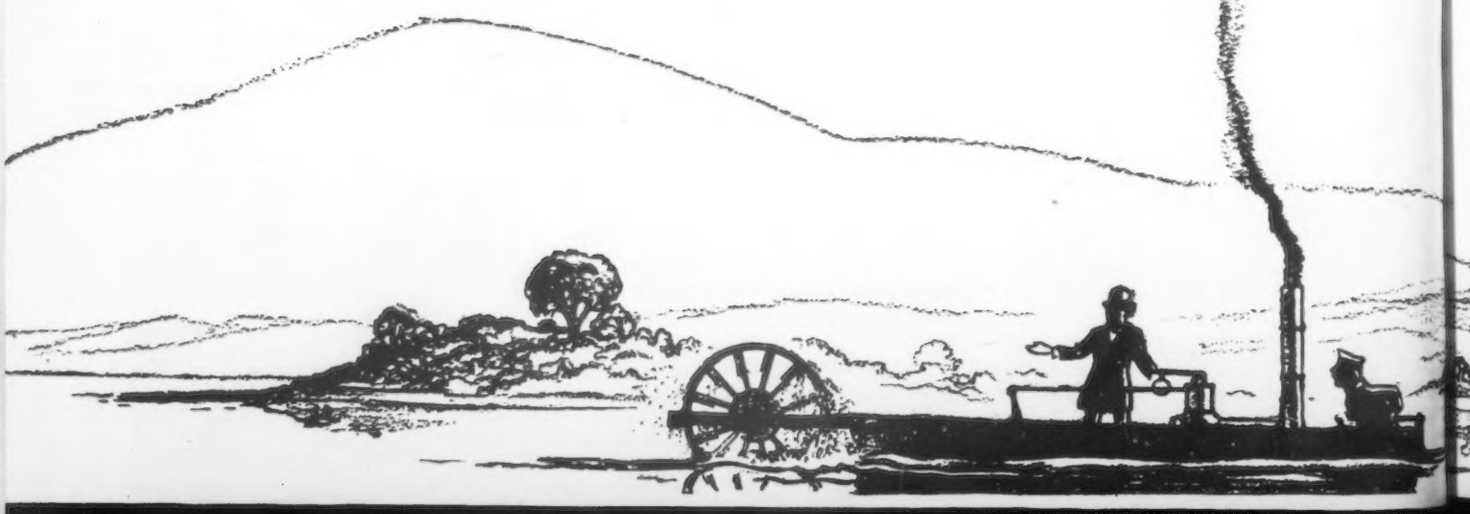
Vertical Miller

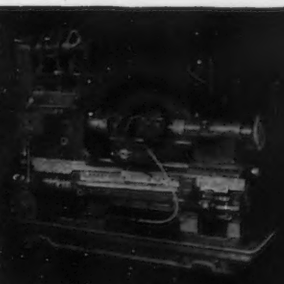
A TOOL room and production machine, able to perform such operations as boring, milling and drilling on various faces of a job at one set-up, has been announced by *Shields Mfg. Co.*, Long Island City, N. Y. The machine can also do the work of a standard universal milling machine such as spiral milling. Upper part of the column contains a large bore for reception of a swivel drum. Attached to the swivel drum is a worm wheel of large diameter, meshing with a worm. The swivel is securely clamped when in any position by means of a large diameter flange and locking drum. The head is swung in goose neck by like means. The spindle is driven by a 3-hp. motor through Reeves variable speed pulley. A four-speed sliding gear transmission is incorporated in the head for power feed down to the spindle of 0.005 to 0.014 per rev. Power feeds and rapid traverse to table and saddle are provided in all directions with directional control. The rate of feed can be varied by the turn of a hand-wheel with rate shown by a dial behind it.



While the Good People

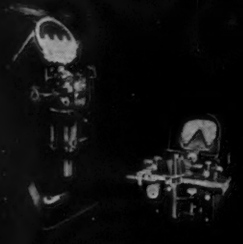
One Sunday morning in the Spring of 1793 (the time when the people were at "meeting" being chosen to avoid the jeers of a crowd in case of failure) Captain Morey launched his steamboat at his ferry landing at Orford and with one assistant to steer, while he himself managed the engine, they steamed up the Connecticut for several miles above Orford and safely returned, making about four miles an hour against a quite rapid current. This was fourteen years before the first trip of Fulton's "Clermont" upon the Hudson.





FAY AUTOMATIC LATHES

AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS

AUTOMATIC OPENING DIE HEADS

...were at "Meeting"

THE last steamboat that Captain Morey made with the original engine of 1793 now lies at the bottom of the Vermont lake that bears his name. Yet the same progressiveness shown in the life of early Vermont industrial pioneers still characterizes Jones & Lamson Machine Company today.

Today's problems, and those of the half-seen tomorrow, are infinitely more complex than those of Captain Morey and his contemporaries but the same spirit that vitalized them is serving industry and our country today. Whether your company is large or small your inquiry, addressed to Jones & Lamson, will receive the careful, detailed study of our engineers.

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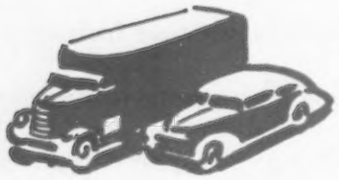
UNIVERSAL TURRET LATHE

RAM TYPE
UNIVERSAL TURRET LATHE

Assembly Line . . .

• Tentative move along road toward manpower control seen at Detroit with weekend announcement of liaison bureau.



DETROIT—Attention is being concentrated on plant manpower problems these days from a number of different directions. A most important angle of this picture appears to involve a tentative move along a road toward manpower control—at least that is the way some industrial executives interpret a weekend announcement of a Detroit liaison bureau between the War Manpower Commission and Selective Service, and current discussions in Washington which may precede a White House directive.

There is no clear-cut statement yet as to the function of this liaison work. But some thinking is that it will first inventory men by skills in each war plant. Then Selective Service would have groups of varying size to work with, from each of which drafting would be proportionate, or roughly proportionate, to the number involved. Order numbers would determine the succession of calls; those with latest order numbers in each skill classification would be the last to be called, even though their numbers might be earlier, under the method as employed today, than those summoned to duty in other skill groups. In other words, deferments would be by order number ranking in occupational groups within factories.

At the same time this liaison office could presumably stop draft calls of any sort on the workers of any factory, if sufficient skilled replacements were not in sight.

It is difficult to see how such a program could be worked out without some degree of allocating workers to jobs. There is suspicion in Detroit that complete manpower control would be the end-result of the program. Beyond that, Detroit executives oppose the plan on the simple stand that it would set up a red-tape weight over manpower similar to those of the priority system and PRP over materials.

The Automotive Council for War Production made the point over the weekend that realinement of war production schedules by the government, placing momentarily less emphasis on output of trucks and other mechanized equipment, will likely result in less labor demand than previously projected. This could well be a plea, the situation being what it is, that no hard-and-fast organization for manpower control be set up until the actual need is more clearly visible. It is now being figured that there is plenty of work for all the employees in the Detroit area, but that a real labor shortage may not be the near term possibility expected as recently as six or eight weeks ago.

Curtailments on some war orders, however, do not mean general curtailment of arms production as a whole.

In Detroit last week C. E. Wilson president of General Motors Corp., stated that manpower was now at least as important a problem for his concern as materials. "We are getting, where we must employ men and women without industry backgrounds," he said. He indicated that by late next year it would be necessary to add approximately 150,000 more workers to the corporation's hourly pay rolls.

At the same time, Mr. Wilson expressed the hope that there would be no freezing of men onto jobs, and no setting up of manpower pools. His opinion was that so-called "passive resistance" would be aroused in the minds of workers if such pooling came to pass.

The Allison Division of General Motors celebrated Armistice Day by opening operations in a huge new plant near its other divisions. The start of limited production work came just four months after ground was broken for this unit. The immense building covers an area which equals the floor space of the present plants.

This enlargement by Allison puts it in the forefront of the country's largest plants. Hitherto, the Ford Willow Run factory has been listed as the largest production plant in the nation, but this rank appears likely to be challengeable by Allison on an overall square foot basis and by Chrysler's new Chicago-Dodge plant, now under construction.

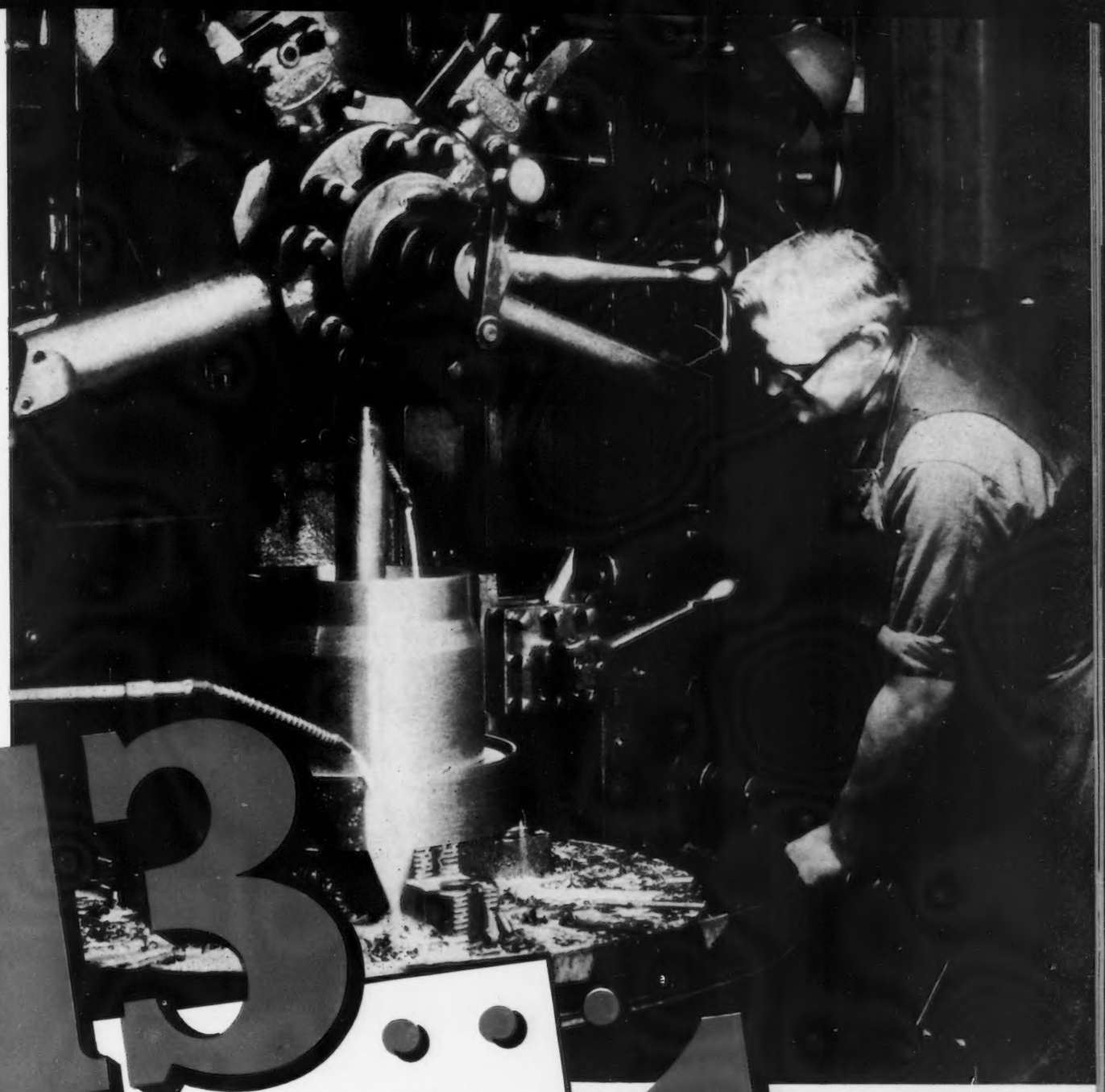
As the enlarged Allison program moves to fuller scope, its requirements for manpower appear likely to develop changes in factory operations. Hitherto, the plants have worked on a three-turn basis. But the amplified needs for men and women workers are expected to effect a gradual transition toward two ten-hour shifts per day.

More women will be hired. The ratio of women to men is now 1 to 4, but it is expected by plant officials to come down to a proportion during this coming year of about 1 to 2. Allison has had very satisfactory experience with women workers, attributable in part to the fact that the work being handled is generally of light weight and hence does not impose noticeable muscular strain.

It should be noted that the remarkable growth of the Allison factory pay roll has necessitated an intense training program in the past few years. More than 70 per cent of the present Allison production staff were hired as trainees with no related skill. Twenty per cent were semi-skilled and only ten per cent were classified as skilled for the job at hand.

Among trainees employed less than two years ago, eight have become foremen, 37 set-up men, and 47 group leaders.

ALLISON, in common with other Indiana plants, is the scene of an extremely interesting development on gasoline rationing. The state gas rationing authority has turned over to these plants the allocation of cards for gasoline, when and if they are issued. Clerical staffs (some 40 people are so assigned at Allison) handle the processing of applications and the issuance of cards. By means of employment records already on file, workers can be allotted the amount of gasoline necessary to take them to and from work and to allow them



13 . . . AT 1 SETTING

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THE BULLARD COMPANY

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the authorized reserve for a small amount of pleasure driving each month.

To implement this policy, Indiana plants are distributing hand-bills to their employees telling them how gasoline rationing will affect them. Pointing out that the basic rationing for driving to and from work is 10 gal. monthly, aside from the six gallon amount for incidental mileage, it is emphasized that no person can get more than this basic ration unless he is sharing his car with at least three other persons to and from work. Plants in many areas have set up transportation advisory committees which develop share-the-ride programs, and these committees also undertake to recommend to ration boards the acceptability or rejection of applications for tires as well as gas.

By contrast there is quite a bit of worry in Michigan over the effect of gasoline rationing, although some relief has been manifested by the decision to delay it for a fortnight.

SUPERVISORY help in various Michigan factories report in consistency enough to be alarming that many men are taking the attitude that if they are restricted to "A" cards, they will simply drive to work as long as their gasoline lasts and then take the rest of the time off. Pay scales and overtime hours being what they are, many workers can afford financially to do this. But, of course, it would result in complete disruption of the production program.

Naturally, these workers can apply for extended rations of gasoline and generally obtain them, but such applications will necessarily take time. During the time lag involved while workers procure their extra ration of gasoline, there is fear that absenteeism will reach an unparalled high.

One Michigan company has suggested to the rationing board which controls its area that it, rather than the ration board, undertake the issuance of ration cards, as is being done in Indiana.

This Michigan factory thoroughly surveyed its employees' requirements for gasoline to get to and from work. The entire metropolitan area in which this plant lies was charted in one-mile squares and the home location of each worker was filed on cards, identified by the square in which he lived. Thus it is possible to determine instantly, for example, that worker A living in city section G-6, 11 miles from the plant, requires 22 miles of travel each day, or 110 miles for a five-day week, to get to work. Obviously a four gallon ration would be impossible to transport worker A. It would be a simple matter for the company to issue the ration cards based upon this mileage information in its files, and then submit the entire job to the ration board for checking and confirmation. But whether such permission can be obtained is questionable, even though the wisdom of the program is lauded by the local rationing board.

AMERICAN TANKS OK: Brig. Gen. Donald Armstrong, chief of the Detroit Tank Automotive Center, speaking at the opening of the new cast armor plant of American Steel Foundries, told his listeners that the American tanks were fully as effective as any enemy machine and that reports from the African battlefield were substantiating this daily. Other notables on the speakers' stand include (front row, left to right) R. D. Brizzora, chief engineer of American Steel Foundries; Lt. Col. John Slezak of the Chicago Ordnance District; R. P. Lamont, retired president of American Steel Foundries; Thomas Drever, present president of the foundry company, and T. S. Hammond, formerly of Whiting Corp. and now chief of the Chicago Ordnance District.

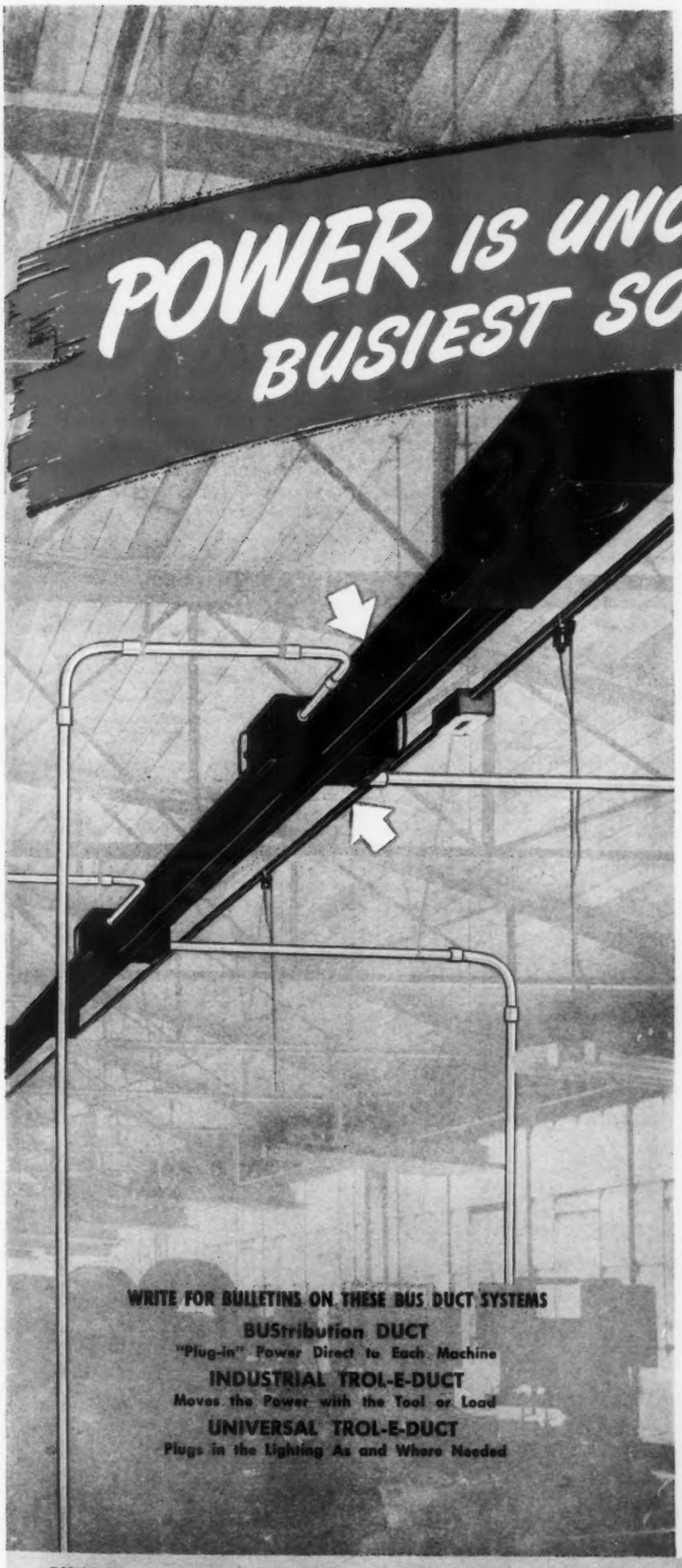
THE opening of the deer hunting season posed another problem for Michigan factories. Believe it or not, conferences between union committees and management were not uncommon in early November on this score. The substantial income of most of the workers during recent months, and their monotonously enlarged hours of overtime appeared to have stimulated a wide desire to go into the north woods, war production and gas and tire situations notwithstanding. For the most part, conferences between management and labor representatives resulted in the working out of plans for spacing hunting trips so as to least impair output.

There have been other labor-management problems this month which, however, did not bring about face to face meetings. One such was the single-day city-wide Detroit walkout of toolmakers and production members of the Mechanics Educational Society of America in protest of a jurisdictional row at the Briggs-Conner plants, between M.E.S.A. and the United Automobile Workers. The two unions and the companies involved never conferred together, the entire conflict being settled through the War Labor Board's representative.

This past weekend saw the Nash-Kelvinator Lansing plant tied up in a dispute over a foreman and his assistant, both disliked by the U.A.W. rank and file membership. The workers threw the supervisors out of the plant, and the management closed operation down. International Union headquarters ordered the local members back to work, but the company held firm to its stand that the issue was simply one of whether it or the union would choose its foremen—so resumption of production was delayed.

The U.A.W. and Chrysler Corp., meanwhile, are arguing over whether to begin to negotiate a new contract, based on 99 proposed changes sought by the union, or to keep the old one.

The gradual emergence of labor problems which have been buried in the backgronud in past months, would indicate that the war-caused labor-management truce is weakening. The concept of no strikes during war may be losing its keenness. Certainly the problem of jurisdiction over maintenance men in Detroit, which precipitated the M.E.S.A. walkout, is still explosive.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Washington . . .

• Use bessemer steel wherever possible, Batcheller advises consumers . . . Metallurgical developments rank it with open hearth grades for many items . . . Converter capacity now 6,721,000 tons.

WASHINGTON — WPB Iron and Steel Branch Chief H. G. Batcheller has made an appeal to consumers to use, wherever possible, steel made by the bessemer process or rerolled from rerolled rails, instead of steel made by the open hearth process. He pointed out that in recent years, steel consumers have become accustomed to buying open hearth steel because of the close controls obtainable over the properties of the steel.

"This practice is being continued today," he said, "despite the fact that bessemer steel or rail steel would in many cases serve equally well."

The enormous demands of war have resulted in engaging either almost fully or entirely all kinds of steel capacity, including bessemer. The effort now is to maintain the restored production of this latter grade of steel and to keep it in the picture both as a popular and a good steel that, by reason of metallurgical developments, ranks in quality with open hearth steel for many products. Refinements, such as dephosphorization, are giving it such a standing that it is being used for a constantly growing list of products, which heretofore were made of open hearth steel. At the same time, however, Mr. Batcheller said that the supply of both bessemer steel and rerolled rail steel is not being used to the best possible advantage. Increased use of this supply, he explained, would relieve the pressure on open hearth steel and be a substantial contribution to the war effort.

WITH respect to rerolled rail steel, its use for making concrete bars and agricutural implements, according to some consumers, has been restricted by lack of supplies, but assurance has been given by Mr. Batcheller that his staff will be glad to cooperate with any buyers in helping them find sources of supply for either bessemer or rail steel.

Bessemer steel, Mr. Batcheller said, is available in many products, including bars, plates, shapes, sheets, strip, pipe, wire products and track accessories. Buyers were urged to scrutinize their requirements to determine whether bessemer steel or rerolled rail steel will satisfy their demands. They were told that those who can use these grades should contact bessemer and rail steel producers for full information.

Mr. Batcheller, of course, did not attempt to list all of the old and new products made from bessemer steel. Developments in this process, the leading source of output from 1870 to 1910, have given it characteristics of some open hearth steel and therefore expanded its adaptability to additional products with the result that the pressing demand has seen some reversion from open hearth to bessemer steel, whose quality has been especially suitable for a wide range of products.

"Long experience has demonstrated that bessemer steel is unexcelled for screw stocks, for certain kinds of wire, for many classes of sheets, for some tin plate, and for many grades of lap and butt weld tube and pipe, particularly the latter, also bars for bolts and nuts and concrete reinforcing and small structural and special shapes," says the Making, Shaping and Treating of Steel. In use for light rails, this authority says it shows greater resistance to wear than open hearth or electric furnace steel.

The increasingly important factor of bessemer steel is shown

ABOARD A CARRIER: This is how it looks on the flight deck of one of our aircraft carriers just before the command to launch plane is given. Every man has his appointed task and stands ready to get planes into the air with clockwork precision. Two men under the wings in the foreground hold wheel chocks ready to insert while the pilot rev's up before taking off.

Harris & Ewing Photo

A Few Simple Precautions
WILL RETAIN NEW-MACHINE ACCURACY
In Your CINCINNATI Plain Hydraulic Grinder

● Depending upon the type, all machine tools have more or less of the quality "inherent accuracy and built-in skill". This new-machine excellence can be largely retained through the observance of a few elementary precautions; first, by the operator, and second, by his immediate supervisor. Here are the principal factors in retaining the wealth of new-machine accuracy and built-in skill in your CINCINNATI 10″ Plain Hydraulic Grinding Machine:

1. Keep machine leveled. Convenient screw adjustment is provided for this purpose.
2. Do not tamper with grinding wheel spindle bearing adjustment. Filmatic bearings will run for several years.
3. Use the right kind of oil, especially (a) for the grinding wheel spindle lubricating system (high grade light spindle oil, 100 to 130 seconds viscosity), (b) the hydraulic circuit (light turbine oil, 145 to 155 seconds viscosity), and (c) way lubricating system (E.P. base oil 290 to 320 seconds viscosity).
4. Replenish oil and clean filters periodically.

These steps are simple and easy to follow, aren't they? Through the observance of them, the machine will not only retain its original accuracy, but it will do so while *producing continuously.*

CINCINNATI

● Grinding a machine tool spindle on a CINCINNATI 10″ Plain Hydraulic Grinder.

● You may obtain a description and complete specifications of CINCINNATI 10″ Plain Hydraulic Grinding Machines (Model ER) by writing for specification catalog, No. G-490.

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

by the expansion in converter capacity. It has grown to 6,721,000 tons for rolling from the ingot and there is also considerable capacity used as hot metal for duplexing in the open hearth.

It also has been pointed out that if there were more metallics—pig iron and scrap—it would be better to use them in the bessemer converter rather than in the open hearth furnace for products that can be made from both grades of steel. The point was supported by the contention that the turnover in the bessemer converter is more rapid than it is in the open hearth furnace and thus the effect of such a policy is to increase production without adding new capacity. It has been estimated that such an increase would be about 11 per cent.

It also has been pointed out that the pig iron supply could be considerably increased by the further use of sintered ore. While many blast furnaces already have sintering equipment and provision for it is made in new furnaces built and to be built under the expansion program, there are many that do not sinter ore before charging it into the furnace. It is estimated that the sintering process increases pig iron production about 10 per cent.

Oil Pipe Inventories May Be Requisitioned

Washington

• • • **OPC says it is going** to take an inventory of oil country tubular goods and redistribute it. The reason for this announcement, which came Nov. 11, is that last March's inventory of pipe was 1,200,000 tons, a year's supply. This was revealed by the metals survey conducted by WPB in June on Form PD-275.

Thereafter every time OPC asked WPB for oil country tubular goods, it was given the answer that it should encourage purchases between oil operators. OPC wants to develop its point that stocks are now dwindling, and back up requests for manufacture of new pipe with the information it is going to get.

The inventory report was issued with the approval and under the supervision of the WPB Materials Redistribution Branch. It was pointed out that any unusually large inventories held by the oil industry can be requisitioned by the WPB branch for use in the manufacture of essential war products by other industries.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

I'M QUITTIN'! I DON'T MIND ALL TH' RAZZIN' I GIT OUTA THAT, BUT WHEN SHE GOES LEAVIN' ME A NOTE, TELLIN' ME TO KEEP MY DIRTY PAWS OFF TH' CURTAINS AN' TIDY UP TH' PLACE~ WHY--
YOU CAN'T BLAME HIM! HE HAS A WOMAN PARTNER AT HOME AN' ONE HERE~IT'S MUCH TOO MUCH!
HIS WIFE IS A GOOD HOUSE-KEEPER, SO THEY SHOULD OF GAVE HIM A PARDNER WHO'S CARE-LESS, TO BREAK TH' MONOTONY!
HOMINESS
COPR. 1942 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
J.R.WILLIAMS 11-20

President Appoints Three NWLB Members

Washington

• • • **Three new Presidential** appointments to the NWLB were made public this week and several appointments to the Administrative staff. The board appointments, made to fill vacancies in the employer membership in the board were:

Cyrus Ching, vice-president of the U. S. Rubber Co., who was formerly an alternate member of the Board, succeeds E. J. McMillan as a regular member, representing industry. Mr. McMillan, president of Standard Knitting Mills, Inc., Knoxville, has resigned to devote full time to his business.

Rueben B. Robertson, executive vice-president of the Champion Fiber & Paper Co., Canton, N. C., succeeds Mr. Ching as an alternate member of the Board, representing industry.

Frederick S. Fales, formerly vice-president and director of Standard Oil Co. of New York, has been appointed an alternate member of the board to succeed R. R. Deupree, president of Procter & Gamble Co., Cincinnati, who resigned to return to his business.

The board also announced the following appointment to the Administrative staff

Harry Shulman, professor of law, Yale University, has been appointed Administrative Associate Member in charge of the Mediation Division, succeeding Ralph T. Seward. He was appointed as associated member of the board by the president.

Carroll R. Daugherty, professor of Economics, Hunter College, New York City, has been appointed director of the newly established Division of Review, Research and Analysis. Mr. Daugherty will serve as the chief economist for the board.

In addition, the board announced the appointment of Jesse Friedin, former principal mediation officer of WLB, as assistant general counsel; Richard R. Brown, former assistant chief of Apprenticeship-Training for WMC as director of the Administrative Management Division and Robert Abelow, former WLB principal mediation officer as assistant executive secretary.

"METALLIC VITAMINS" FOR INDUSTRY

So effective are relatively minute quantities of cemented carbides in stepping up—pepping up—production that they are often called the "metallic vitamins" of industry.

Because only small quantities are required per tool, Carboloy cemented carbides are measured in grams. A gram is 1/453rd part of a pound. A Carboloy tool tip weighing only 25 grams or slightly less than one *ounce* is a good size tip—enough to last for days, weeks—often months of cutting at speeds often higher than 4 to 5 times that possible with ordinary steel tools.

In terms of production, an ounce of cemented carbide can turn the turrets of dozens of tanks, or drill hundreds of guns, or turn as many as several hundred shell, or bore the cylinders of hundreds of "Jeep" cars. One ounce of Carboloy can do these and countless other crucial machining jobs faster and better than any other tool material.

These "metallic vitamins" also serve the cause of victory in many other ways. On masonry drills, they drill holes 75% faster for installing war production machinery. . . . In dies they speed up production of wire, cartridge cases, bullets, etc. . . . As wear-resistant inserts on vital machine parts, they keep machines running. As a matrix material, they conserve diamonds, shorten operating time on mine drilling, dressing of grinding wheels, etc.

The myriad of present uses for Carboloy—the "metallic vitamin" of industry—now helping to speed the day of victory, forecast the steadily increasing diversity of benefits for the years of peace to come. ★★ Carboloy Company, Inc., Detroit, Mich., Chicago, Cleveland, Los Angeles, Newark, Philadelphia, Pittsburgh, Seattle.

CARBOLOY

TOOLS • DIES • GRINDING WHEEL DRESSERS
CORE BITS • MASONRY DRILLS • WEAR PARTS

MANUFACTURERS OF TOOLS, GAUGES, ETC., SUPPLYING PRODUCTS TIPPED WITH CARBOLOY CEMENTED CARBIDES

B. C. Ames . . . . Waltham, Mass.
Apex Tool & Cutter, Shelton, Conn.
Barber-Colman . . . . Rockford, Ill.
Bokum Tool . . . . Detroit
Carbide Tool . . . . Chicago
Cleveland Cutter & Reamer . . . . Cleveland
Cleveland Twist Drill . . Cleveland
Cogsdill Twist Drill . . . . Detroit
Cole Carbide . . . Royal Oak, Mich.
A. A. Crafts . . . . Boston
Criterion Machine Wks. . . . Beverly Hills, Calif.
Davis Boring Tool . . . . St. Louis
Detroit Boring Bar . . . . Detroit
Henry Disston & Sons . . . . Philadelphia
Eclipse Counterbore . . . . Detroit
Ex-Cell-O Corp. . . . . Detroit
C. J. Forthman . . . . Cincinnati
Gairing Tool . . . . Detroit
Gen. Eng. & Model Wks. Pittsburgh
Genesee Tool . . . . Fenton, Mich.
Gern & Anholt Tool . . . . Detroit
Goddard & Goddard . . . . Detroit
Gorham Tool . . . . Detroit
Hartley Wire Die . . . . Thomaston, Conn.
Kelly Reamer . . . . Cleveland
Kiffer Tool & Die . . . . Cleveland
Lincoln Park Tool & Gage . . . . Lincoln Park, Mich.
Lovejoy Tool, Springfield, Vermont
Madison Mfg. . Muskegon, Mich.
McCrosky Tool . . Meadville, Pa.
Midwest Tool & Mfg. . . . Detroit
Metro Tool & Gage . . . . Chicago
Morse Tool . . . . Detroit
Morse Twist Drill & Machine . . . . New Bedford, Mass.
Motor Tool Mfg. . . . . Detroit
National Tool . . . . Cleveland
O. K. Tool . . . . Shelton, Conn.
J. S. Popper, Inc., Union City, N.J.
Production Tool Co. of America . . . . Detroit
Reeder Carbide Tool . . . . Detroit
R. & M. Mfg. . . . . Detroit
Scully Jones . . . . Chicago
Sheffield Corp. . . . Dayton, Ohio
Ralph Shipman . . . Sunbury, Pa.
Simonds Saw & Steel . . . . Fitchburg, Mass.
Landon P. Smith, Irvington, N. J.
Sommer & Maca Glass Machinery . . . . Chicago
Sprague & Henwood, Scranton, Pa.
Standard Gage, Poughkeepsie, N.Y.
Standard Tool . . . . Cleveland
Staples Tool & Engineering . . . . Cincinnati
L. S. Starrett . . . . Athol, Mass.
Strauss Co. . . . . Pittsburgh
Super Tool . . . . Detroit
Trubor Tool . . . . Yonkers, N. Y.
Tungsten Carbide Tool . . Detroit
United Twist Drill & Tool, Chicago
Van Keuren Co. . . . . Boston
Harry W. Wagner . . . . New York
Walker Tool . . . . Cleveland
Wendt-Senia Drill Wks. . . . Hannibal, Mo.
Weeson Co. . . . . Detroit
Wetmore Reamer . . . . Milwaukee

WEST COAST . . .

• West Coast shipyards protest Kaiser's influence . . . His wages threaten labor stability . . . Steel capacity future questioned . . . Aircrafters worried by enlistments.

SAN FRANCISCO — Wasn't there something a little grotesque and almost cynical in the selection of Mrs. James T. Byrnes, wife of the national economic dictator and former supreme court justice, to christen the Maritime freighter Robert E. Perry at Henry J. Kaiser's Richmond yard No. 2 when a new speed record was established, keel to launching in four days, 15½ hours?

If there is a more unpredictable operator than Henry J. Kaiser, he has not yet appeared in the headlines. If any influence or operation has upset and unstabilized economics, industry, production, housing, and just plain getting-along on the West Coast more than have the varied and considerable operations of the Kaiser companies, we can't think of them at the moment.

While Mrs. Byrnes broke the bottle and received the wrist watch, her astute husband, aided and abetted by scores of agencies of War Production, War Manpower, Labor Relations, Price Administration and general industrial relations, not to mention housing, transportation and general labor relations, dodged and darted here and there attempting to keep up with the race and to hold back the tide of virtual panic and protest from all other operators in all other pursuits on the Pacific Coast, including even the military and naval.

However, and to be sure, the record was another notable achievement by the irrefutable Kaiser organization. The previous record was ten days and 12 hours, set by Mr. Kaiser's Oregon yard near Portland only a month or two ago. It was cut in less than half, simply by more extensive sub-assembly and greater facilities for whipping these big parts together, after the keel was laid at 12:01 Sunday morning, just about the same hour that General Eisenhower and his legions landed in North Africa.

It is earnestly and devoutly claimed by the management that these record achievements are not only a publicity plum, but that they stimulate interest and accelerate activity on the other hulls in the yard. Moreover they are undoubtedly a stimulus to other yards and they quicken the pace.

On the other hand, from a professional standard, a less than five day ship is bound to be thrown together.

The entire Bay Area caught the spirit of the thing, for the Pacific Bridge Co. the very next day floated one of its 4350 tons coastwise freighters, 70 per cent ready for sea, in 80 hours after the keel laying.

All the while there were other yards on the same harbor patiently, painstakingly, more slowly but far more surely, mastercrafting the special naval vessels which require far greater craftsmanship and deserve even greater credit. These seasoned shipbuilders with their expert crews proceed more conventionally and have little to say while the newcomer seizes the headlines and breaks the records. Yet it perhaps would have been more appropriate that the wife of the stabilization director should have presided at the launching of the sub tender Proteus at Moore's yard the same day or at one of Bethlehem's or Western Pipe's naval vessels.

During the last war at a Bethlehem yard a 10,000 ton cargo vessel for the Shipping Board was completed in 26 days, keel laying to launching, including all riveted construction. That was a long standing record and it is respectable today. There was little or no sub-assembly in those days and when the records of man hours per hull are counted and the total wages per ship, there may be even greater credit to the builders 25 years ago who are still invaluable in the war effort.

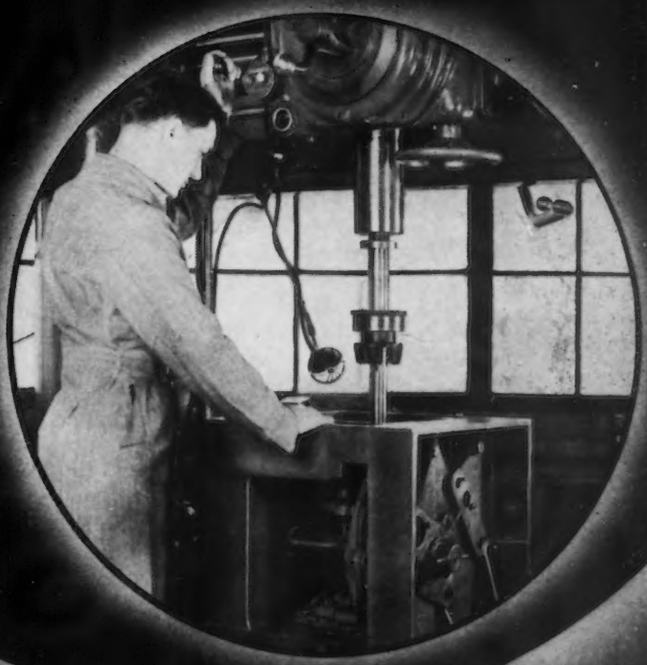
Richmond, on the east shore of San Francisco Bay, north of Berkeley and Oakland, is an hour's ferry journey from San Francisco and about 20 miles by Bayshore Highway. Formerly principally oil refinery, railroad shops and miscellaneous small industries, it is now the largest single center of merchant ship construction in the world. And it's all Kaiser. Between yards No. 1 and No. 2, adjoining, are 19 ways with their adjoining shops, yards and assembly and track facilities. The newest development, Yard No. 3, is laid out around five "basins" or graving docks where the sea comes down to the ships when they are ready to float.

To man these yards and facilities some 75,000 wage earners are divided among three shifts. That is probably something like 50 per cent of all the shipbuilding wage earners in the San Francisco Bay Area excluding the Mare Island Navy Yard with its civil service workers engaged entirely on Navy construction and repair. In Oregon near Portland Kaiser operates three additional yards with at least 50,000 more men. So his operations now include from 25 per cent to 33 1/3 per cent of all the shipbuilding wage earners on the West Coast.

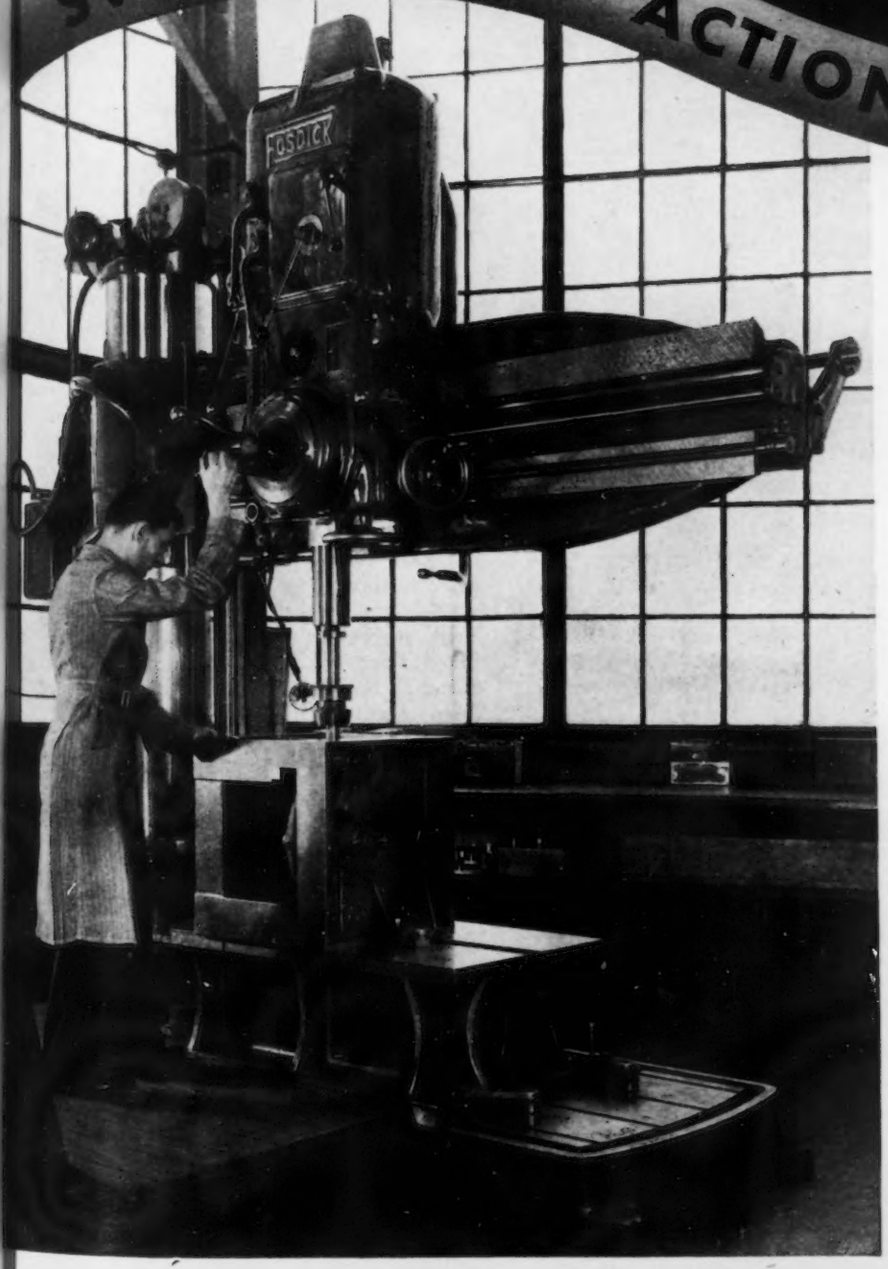
It's plain to be seen and a commonplace to those familiar with shipbuilding that, to set production records and deliver 29 complete Maritime Commission vessels for an average of 53 days per ship as were delivered by the Kaiser yards in the month of October, requires a big reserve of manpower. Like a good football team the construction crews must be two deep to keep producing at that rate.

But the sacrifices to stabilization have been, are and will continue to be tremendous. Average wages in shipbuilding are $1.398 per hour or $60.19 per week according to the last labor statistics of California's Department of In-

FOSDICK RADIAL



SWINGS INTO ACTION AT . . .



A PROMINENT MACHINE TOOL PLANT

A box jig is used to hold the work on this Fosdick Radial Drill for drilling—reaming or tapping various diameter holes from two or more sides.

The jig facilitates handling the work while the centralized control in the head make instantly available for the operator a selection of feeds and speeds as well as hand feed.

This is only one of many parts of various machines built by this concern that are drilled, tapped or bored on this Fosdick Radial quicker—easier—at lower cost.

If your work can be handled on a Radial put it on a Fosdick.

Fosdick Radial Bulletin RA gives full particulars. Write for one.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI . . . OHIO

dustrial Relations. This compares with average hourly wages of $1.023 for foundries, $1.003 for logging, 84c for electric railway and bus drivers, and 51.7c for hotel employees. While the average shipbuilder earns $60 a week, the average hotel employee earns $22.06 per week, or did until he left to start in the shipyards at 97½ cents per hour minimum for common labor and unskilled helpers. With well over 100,000 jobs between Richmond and Portland, Mr. Kaiser and the other shipbuilders are frozen to a wage scale well above any other, and Uncle Sam pays the bill through the Maritime Commission. So the loggers leave the woods, the packers leave the canneries, the bus drivers leave their buses, and the bus boys, elevator operators, and waiters leave the hotels and restaurants just as they did in the days of '49, only they now grab welding gloves and helmets instead of the pick and pan of the prospector. No rooms or houses or even meals are to be obtained within 15 miles of the yards, transportation is paralyzed, telephone lines are taxed to the breaking point, and most of the other activities of most of the rest of the West Coast are upset and unstabilized by this shipbuilding wage scale and activity of which Mr. Kaiser has become the symbol.

With 50 or 60 sub-contractors within a radius of 200 miles of the yard location, the wage scales are passed along to smaller rural communities where $1 to $1.40 an hour with time and a half for overtime over 40 hours is a standard beyond the dreams of avarice hitherto. So now the farmer can wait for his plow shares while the blacksmith supplies a sub-contractor. The cows go unmilked and are sent to the slaughter so that the former milkers may get in on the gravy, or take the place of someone who has joined up.

No one but the Maritime Commission knows what the price of these ships is. In a time such as this price is secondary. It is to the notable credit of American production that such records can be set. But part of the price, and above the cost figures, is a disturbance and unstablization of wage scales, rents, housing, transportation and general wear and tear on the Pacific Coast that is rapidly reaching a climax.

Honorable James T. Byrnes may soon be following his wife to the West Coast, and it will be necessary for him to break more than a bottle to get things back on an even keel.

When President Benjamin F. Fairless of United States Steel Corp. visited the West Coast, he indicated that blast furnace operations would be started on the newly installed small furnace moved from Joliet to Ironton, Utah, shortly after the first of the year. He predicted that operations at the new Geneva plant should start by the middle of 1943 or soon thereafter. He explained that material delays have put the project some six weeks behind schedule up to this time. He stated that 8000 men are employed in Utah construction at this time and that 4000 men will be required for operation after the plant is complete.

Mr. Fairless let it be known further that the Corporation plans further expansion of its Pacific Coast rolling and mill facilities at Torrence in southern California and Pittsburg on upper San Francisco Bay. "But you don't create a demand for steel by building a steel mill," soundly observed Mr. Fairless as he looked to the uncertain future when emergency war demand shall have stabilized and normalized and when, in all probability, shipping will again be available for low rate transportation inter-coastal through the Panamal Canal.

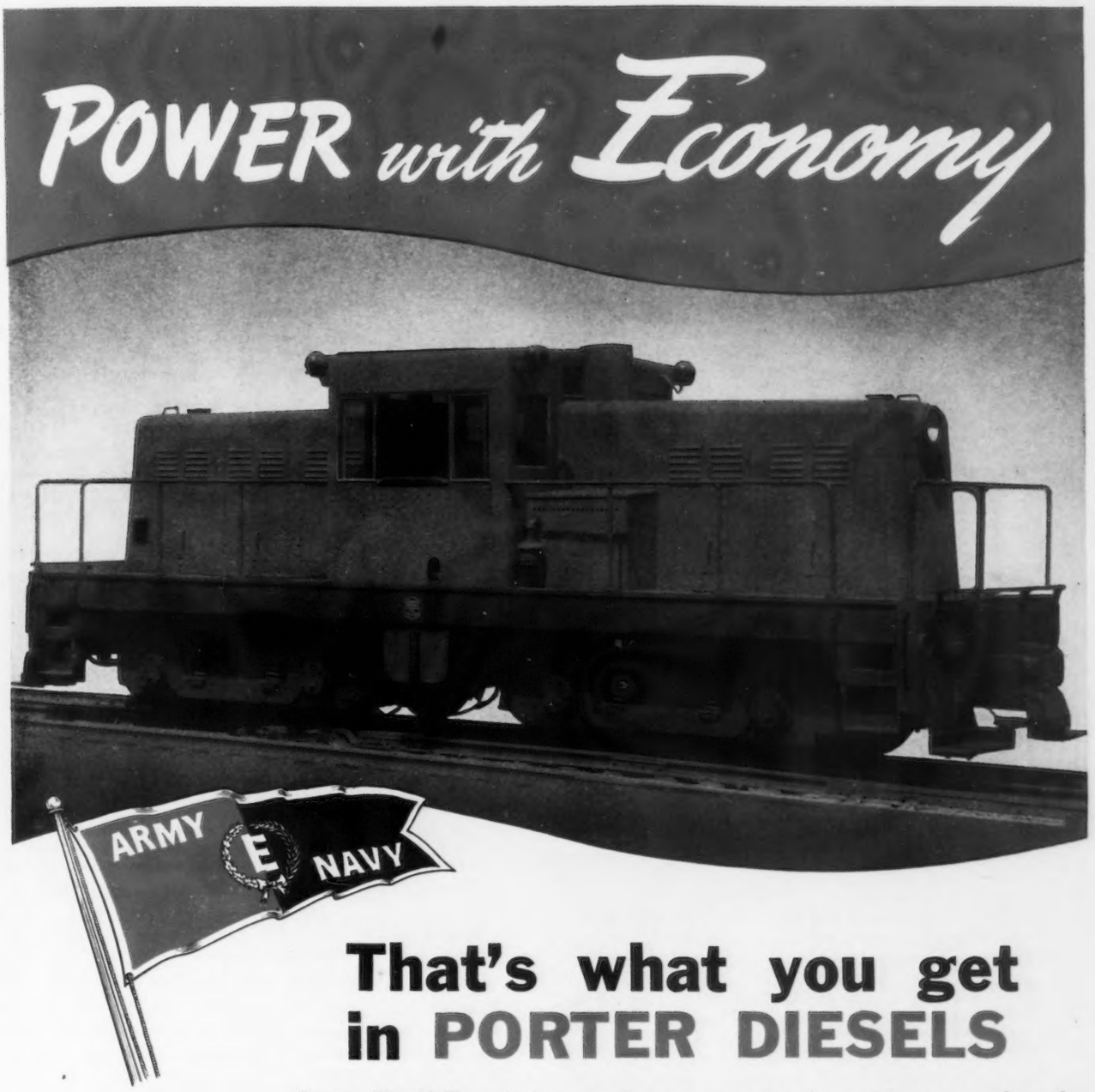
Warehouse men wear the first smiles they have dared for six or eight months, for the directives effective Nov. 1 which definitely allocate quantities for warehouse stocks have already caused shipments and are beginning to cause receipts. It is at least encouraging to the long suffering warehouse operators to be advised that orders are scheduled and to receive definite shipping dates. Moreover, the warehousemen feel assured that the 45 day inventory requirement limit to be worked out through Steel Recovery, Inc., will bring dormant unbalanced reserve stocks from manufacturing and miscellaneous sources into warehouse channels on the West Coast.

Aircraft makers are still principally troubled by exodus of manpower into the armed forces usually on a voluntary basis and because of a revival of reports that voluntary enlistments and recruiting soon will be prohibited by the government. Unfortunately it is the skilled workers, the foremen and key men who go and the aircraft industry is plainly and openly alarmed. In September the southern California aircraft industry lost 4844 men to the armed services it is reported, 89 per cent of them voluntary. The stampede has accelerated, they say. Materials, wage scales, industrial relations and technical problems are incidental to manpower just now.

Harris & Ewing Photo

STICKY BOMBERS: One of the most feared weapons in tank fighting is the "sticky bomb" bomb shown being prepared here by Pvt. Herman Dorman and Sergt. William Winter. The sticky bomb is a sock filled with high explosive to which is attached a short fuse. The heavy grease shown being applied holds the bomb to the enemy tank until the charge explodes. Molotov Cocktails, which consist of a bottle of gasoline wrapped in burning rags are another feared weapon prepared by the tank hunters at the tank training area, Camp Hood, Texas.

POWER with Economy



H. K. Porter Company, Inc., was one of the first to receive the Army - Navy Production Award.

That's what you get in PORTER DIESELS

Porter Diesel Electric Locomotives are proving by performance that they are tops on the toughest haulage jobs. Heavy welded steel trucks and main frames, and modern rugged construction throughout assure users of maximum operating and maintenance economy per ton moved.

Get the full story on the Modern Porter Diesel Electric Locomotives. Porter Diesels are built in a range of sizes from 25 tons to 80 tons.

(Illustrated above is a typical 65 ton double power plant unit.)

Before you consider a locomotive let Porter Engineers recommend the size and type that will best suit your particular hauling job.

PORTER "better built" locomotives

ONLY PORTER BUILDS A COMPLETE LINE OF LOCOMOTIVES FOR INDUSTRY

H. K. PORTER COMPANY, INC.

PITTSBURGH PENNSYLVANIA

CHICAGO NEW YORK

Fatigue Cracks BY A. H. DIX

Angeline Strikes Back

• • • Thanks to Charles Baird, v.p. of Crobalt, Inc., Ann Arbor, Mich., we are in on the last round of a fight that has been raging in the *Detroit Free Press'* "Voice of the People" column between Mack and Angeline. It seems that Mack doesn't like the idea of women in industry, and said as much in a letter to the paper, adding that he was throwing up his defense job to join the Navy.

Seeing mauve, Angeline rushed into print with this:

> The women who work in defense plants go to school first and learn every little thing that's important about their job and the machinery. Yet the men think they know all about it.

Mr. Baird is anxious to get the name of the school Angeline attended, as he would like Crobalt employees to take a short course there, and is thinking of enrolling himself, so that he will learn every little thing that's important.

Angeline's teachers are doubtless blushing at her faith in their omniscience, and as she herself grows in knowledge she will look back with embarrassment at the days when she saw no chink in her mental armor. But we think this high initial confidence is all to the good, for it will sustain her in those dark hours when she encounters problems that teacher overlooked.

As she solves those problems, she may in time become a better man than Mack, and a subconscious fear of that may be the reason for Mack's retreat to the Navy.

Stoppers

Why water the pig?—*Surface Combustion.*

Have you the N.E. blues?—*Shell.*

Two E's Over, One Y Shy

• • • One-third of this page's loyal army of eighteen readers jeers us for misspelling *trusty* in this sentence, "A trustee in the county jail was asked . . ." "Was it," asks C. H. (Eastman Kodak) Steele, "part of the joke or merely a further proof of the statement you made about your proofreading?"

O. T. Fell, of Oberlin, Limbach & Day, patents and patent causes, Leader Bldg., Cleveland, asks acidly, "Is it in Jersey that the jails have 'trustees' who wash 'widows?" And J. A. Davenport reasons "a trustee might object to washing widows in the county jail even if it were a provision of his trust."

It wasn't a typographical error. We wrote it *trustee* in our copy and that is the way it came out. We didn't know any better. But we could squirm out of it if it were not for the word "county." Trustees, the errant kind, are usually found in state prisons.

Aptronym

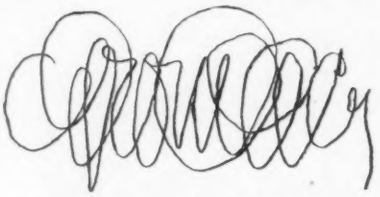
• • • Our well of aptronyms has run dry. A letter came in the other day signed "G. O. Manifold." We looked at the letterhead, hoping against hope that he was with a carbon paper company. But he wasn't. He is a captain with the Pittsburgh Ordnance District.

Painful Penmen

> From your Oct. 22 page I see that you have a collection of illegible signatures. I have made a hobby of collecting such signatures for quite some time and am glad to send you my collection for your perusal.
>
> —*H. M. Williams, Vulcan Iron Works, Wilkes-Barre, Pa.*

We have examined Mr. Williams' 117 specimens carefully, and award the blue ribbon to No. 5, a full-blown beauty, with a wing spread of 8 in., and a height of 5 in., masking the name of R. T. Head. We are sorry that space limitations forbid reproducing it life size. Here it is, much reduced:

The majority of the specimens are signatures that have been streamlined for speed. These do not interest us much, as they are merely time-saving devices evolved in self-defense by men who are required to write their names many times during the day. We like the labyrinthine creations on which time and effort are lavished lovingly. Our selection for second prize is therefore No. 99. The majesty of this, too, suffers by reduction. In its natural state it is a full two by four:



The author of it is unknown, and if you are good at ciphers you might try to unscramble it. Our guess is that it is palimpsestic, in that the initials are apparently superimposed on the surname. If this is true, we offer as a starter, J. O. Cronin.

Pea Shooter

> I like your magazine and don't mean to heckle you too much, but that Nazi Galloping Gun shown on page 114 of your Oct. 22 issue sure is a lot of equipment for a 15 mm. shell.
>
> —*George E. Atzberger, Director of Sales, The Cyril Bath Co., Cleveland*

Should be 105 mm. The gremlins got into the lino again.

Puzzles

• • • We have assorted answers to the Oct. 29 dog and rabbit problem. The propounder, Lt. Com. Simpson, gave the answer as 2.5 min., but said he wasn't sure. Thomas Cannarella says that is exactly right. But J. M. (Hyatt Bearings) Kelly arrives at 2.40 min.; L. R. (Lee Grinder) Titcomb makes it 2.52 min.; J. B. (American Cast Iron Pipe) Hill, Jr., says it's 2.20, while L. (Montgomery Ward) Ladd declares the right answer is exactly two minutes. No one but Mr. Titcomb was brave enough to show how he arrived at his answer, so at the moment we are in a dither.

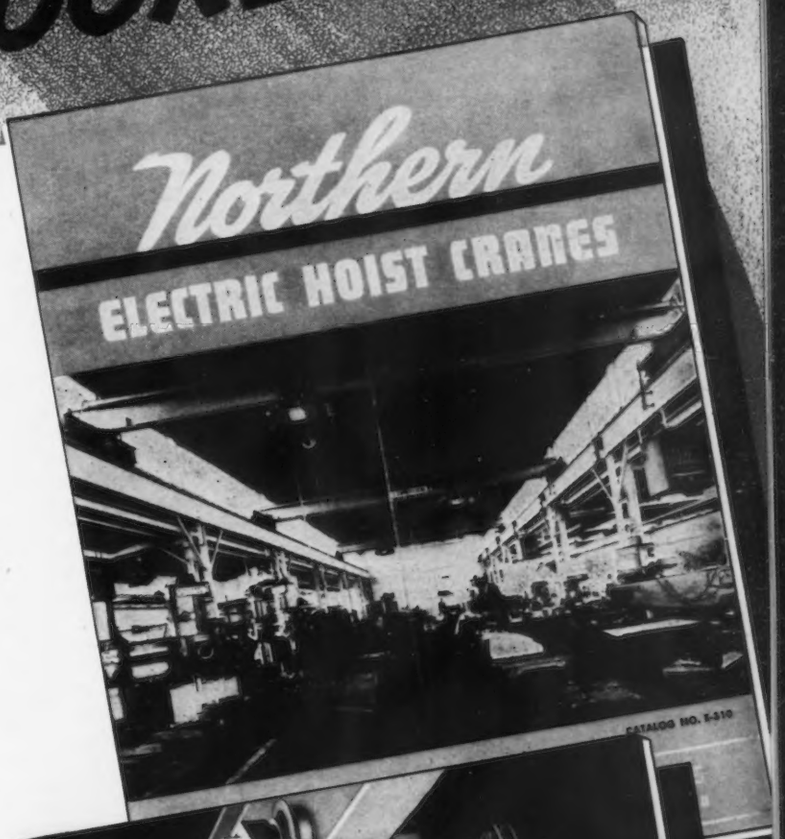
E. N. (Napoleon Products) Yeager and A. A. Mol had no trouble at all in pairing up the husbands and wives in the Nov. 5 pig problem. And thank you, C. I. (TCI&R) Auten, for the solution and the orchid.

We are running low on puzzles, and this one swiped from Dictaphone's bright little house magazine, "It's Said and Done," will be sneered at by the master minds, but even they will get a gold star on their reports card for an answer in 25 seconds or better:

> A man upset a basket of potatoes. He picked them up in 2's but found that he had one left over. Becoming interested, he overturned the basket again and picked them up in 3's, but again found he had one left over. He picked up in 4's, 5's, and 6's, and there was always one left over. Finally, when picked up 7 at a time, they came out even. How many potatoes were in the basket?

Send FOR THESE BOOKLETS

ON ELECTRIC HOIST AND HOIST CRANES



Electric Hoist Cranes are economical in first cost, easy to handle—are built in various capacities up to those large enough to move 15-ton loads.

They may serve as auxiliary handling equipment in connection with large overhead traveling cranes in large plants, or may move all of the material in small plants.

The Northern Hi-Lift Hoist

The essential feature of these Cranes is the Northern Hi-Lift Hoist, a modern low headroom hoist built with machine tool precision. Outstanding in design and construction, it gives maximum hook lift, assures continuous operation, provides positive control and safer handling.

The Northern Electric Hoist Crane is built in many different types, including cab or floor control.

We furnish the Crane complete, or furnish the Hoist and end trucks plus necessary accessories and drawings. In this case you can save freight by buying the girder locally.

★ *Write for copies of these books*

NORTHERN ENGINEERING WORKS

General Offices:

2707 Atwater St., DETROIT, MICH.

NORTHERN CRANE & HOIST WORKS, Limited
WINDSOR, CANADA

Offices at—44 Whitehall St., NEW YORK • 547 [illegible] PITTSBURGH • [illegible] CHICAGO • [illegible] Central Parkway, CINCINNATI • 4135 Gratiot Ave., ST. LOUIS • [illegible] BIRMINGHAM • [illegible] HOUSTON • [illegible] University Ave., ST. PAUL

Dear Editor:

"LOST WAX" CASTING METHOD

Sir:

The writer is attempting to locate a particular type of rubber, or a synthetic comparable to it, of the kind formerly used by jewelers for duplication purposes, especially in using the "lost wax" method of casting.

H. BLYE,
Works Manager
General Bronze Corp.,
Corona, L. I.

• Practically all of the major rubber companies are (or were) able to supply the type of rubber used for jewelry casting. The process is a common one in the jewelry trade, and for supplies and operating information we recommend you try Goodrich, Goodyear, U. S. Rubber, or other rubber companies.—Ed.

EMPTY CHAIR

REFER ARTICLE "THE EMPTY CHAIR" BY J. H. VAN DEVENTER OCT. 29 ISSUE. MAY WE HAVE PERMISSION TO REPRINT IN OUR WORKS PUBLICATION "QUALITY NEWS" WITH CREDIT?

E. S. SMITH,
Editor, "Quality News"
General Electric Co.,
West Lynn, Mass.

• Certainly.—Ed.

LIFE IN ENGLAND

(The writer of the remarkable letter that follows is the head of a prominent English metal products manufacturing firm. He sent it to his friend, a New England manufacturer. The Iron Age obtained permission to publish it with the provision that the names of both the writer and recipient be withheld.—Ed.)

It is a long time since I wrote you about anything but small matters of business, and I gather from your letter, which certainly gave me a good deal of information, that you would like a similar letter back.

As to the progress of munition factories, in my opinion we are getting near the peak of our effort, and I say this from the labour angle. All our women are working, but I don't think you can realize what this means; in England, as you know, anybody with over a few hundred pounds a year used to keep at least one maid, and well-to-do folk used to keep a bunch of them; that is all finished now —there aren't any maids, as they are all working at something else. Every man's wife, no matter what rank, if she is under 40 years of age, is working unless she has some small children. All women are working whether they like it or not, and many of them are nowhere near their homes; they have left their houses and their husbands and are working on whatever job requires doing in their neighbourhood. . . . There is no idleness in this country.

Now we cannot very well take a holiday — people like myself at any rate; we try to, of course, but the last time I tried I found six old men to play golf with, all of them over 70, and I felt quite a boy amongst them —and I am 65. There is no petrol for pleasure motoring, therefore, you must go by train, and you won't go by train if you can avoid it; you might get a seat, and then again you might not, but whether you get a seat or not the train would be packed to capacity and there is nothing to eat on it. It is very uncomfortable so you just don't go! . . .

Now the food situation is not so bad; we have plenty of good solid wholesome food, but we have no trimmings of any moment. Of course, we have not had any fruit since last summer; I think there have been a few oranges round about, but speaking broadly we have no fruit until the trees crop this summer.

However, we are all very cheerful, and though we are not winning the war in the sense that we are winning battles, this country has no doubt about the ultimate outcome, and we are quite sure that we are no bigger fools than any other nation; the mistakes we are making will in due course be rectified, and we do not believe they are any more serious than other people's mistakes. I personally am sure that in the long run we shall make fewer "bloomers" than our enemies.

This country is full of troops and munitions, and we could resist an invasion I think quite comfortably—but I don't believe we shall ever have one, we are going to do the invading ourselves. . . .

Our relations with labour are pretty good, and, with the exception of some small troubles in the coal trade, most workmen are doing their best; I think we can still do better, but not a lot, and for any improvement in the materials position we shall have to look to the United States, as we are doing, and I am quite certain they will fill the bill, and that some fine day (I don't know how many years hence) the thing will end.

It is my private opinion that the trouble will begin when the war finishes; I don't know how far I am right in this but it is what I thoroughly believe; the Armistice period, which might extend for years, will be a very, very troublesome time, and industry in this country will be in leading strings for longer than I shall be working. I think that is fairly well indicated. It does not depress me because men like myself have made up their minds that they will not see again prosperity as we used to know it. Our prosperity will have to be that of the mind, and being satisfied with values that are not material, as it is very obvious that never again will large houses in England be occupied by wealthy people, they will have to be closed down or turned into museums, or just left to rot away like manor houses and castles were in former times, the ruins of which we see up and down the country.

I don't know what the newspapers and public men are preaching in the States, but here, when they are not talking about the war, they are preaching about a brave new world we are going to build when it is over. Candidly I don't believe in a brave new world—I don't think it will happen—I think it will be the same old world with the same stupid men in it as there is today, and collectively we shall be a lot poorer as we must be, seeing that for so many years we are destroying our wealth.

But with all this, this country is not pessimistic. We don't mind; in another generation we shall pick it all up, possibly, but not by means of any great schemes; if ever we do pick it up, we shall do as they did in the past, by private and individual enterprise which, if given a free hand, will get us out of our troubles.

IHRIGIZING

Sir:

We have recently had the process of Ihrigizing brought to our attention. Will you please advise us whether any articles in connection with this subject have appeared in THE IRON AGE, and, if so, in what issue.

W. E. WILSON
Commonwealth of Australia,
War Supplies Procurement,
Washington, D. C.

• See THE IRON AGE issue of May 21, 1936, page 41. Ihrigizing is a process of impregnating steel with silicon by packing the steel objects in boxes with metallic silicon or high siliceous materials, and heating to about 1800 deg. F. It is named after Harry K. Ihrig, of Globe Steel Tubes Co., Milwaukee, Wis. The case, containing about 14 per cent silicon, will withstand boiling in 10 per cent sulphuric acid for over 100 hrs., and resists highly oxiding atmospheres up to 1800 deg. F.—Ed.

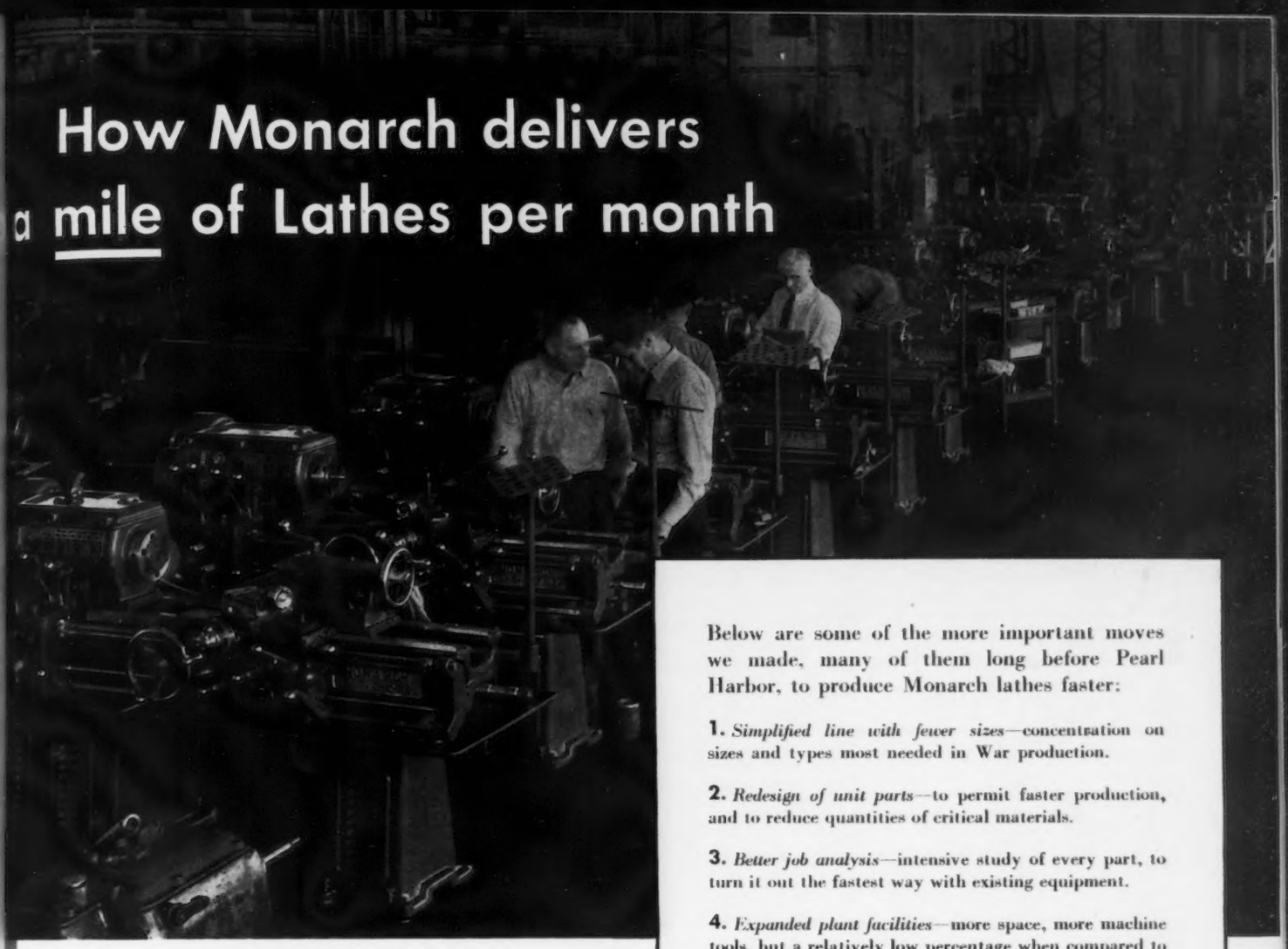
JAP MACHINE GUN

Sir:

Referring to the picture of the captured Jap machine gun on page 92D of the Oct. 29, 1942 issue. The "peculiar" handle is for carrying the gun and the bell-shaped muzzle to hide gun flashes. In fact, the Jap machine gun is obviously copied from the well-known Bren light machine gun, originally developed in Czechoslovakia and now the standard equipment for all British Empire and some other Allied armies. The Bren gun has probably been in action on more war fronts than any other light machine gun.

E. G. REBURA
Toronto, Ont.

How Monarch delivers a mile of Lathes per month



The exact number is a military secret. But if you use the old method of placing them "end to end," they'll stretch out a mile, almost any month. And they're all going into the fight for Victory.

Our production in 1942 is double that of 1941, four times that of 1940. Several reasons account for this, which are listed briefly at the right.

If you can use our experience to increase your production, we are anxious to share it. We have no secrets about *anything* that will help bring Victory faster.

MONARCH LATHES

COVER THE TURNING FIELD

Below are some of the more important moves we made, many of them long before Pearl Harbor, to produce Monarch lathes faster:

1. *Simplified line with fewer sizes*—concentration on sizes and types most needed in War production.

2. *Redesign of unit parts*—to permit faster production, and to reduce quantities of critical materials.

3. *Better job analysis*—intensive study of every part, to turn it out the fastest way with existing equipment.

4. *Expanded plant facilities*—more space, more machine tools, but a relatively low percentage when compared to our rate of production increase.

5. *Better tooling*—to fit the job, and with almost 100% use of tungsten carbide tools.

6. *Better plant layout*—to avoid back tracking, useless handling of materials and processed parts.

7. *Reduced "waiting time"* for materials by careful scheduling, which also reduces inventories on critical materials.

8. *Supervisor training*—continuous classes to develop competent supervisors needed to guide heavy influx of new workers.

9. *Vestibule school*—for every new man and woman employed, in which they are observed, trained and then placed where they will be most useful.

10. *Three balanced shifts*—with 7-day operation to get the most production out of every machine in our plant.

11. *Loyalty and patriotism* of every employe, who knows the lathes they build turn out implements and munitions for Victory. They know this is *their* fight, too, and *they're doing the job.*

Realizing the value of *time*, we have sacrificed everything to it, except one basic principle. There shall be no let-down in the quality and accuracy of Monarch lathes, for this means only ultimate *waste* instead of *saving.*

THE MONARCH MACHINE TOOL COMPANY • • • SIDNEY • OHIO

This Industrial Week . . .

- ***Naval Victory News Spurs War Plant Workers***
- ***Layoffs for Deer-Hunting Cuts Detroit Output***
- ***Manpower Problem Shows Constant Growth***
- ***More Straws Point to Late 1943 Steel Surplus***
- ***Ingot Output Climbs Half Point to 100 Per Cent***

ANOTHER naval victory in the Pacific and so-far successful operations by American and British troops in North Africa this week were twin shots in the arm for the Nation's war industries.

Reports from various metalworking centers where weapons are being fashioned suggest there is no morale builder like a victory over a formidable opponent. Many units in the industrial war machine in the next few weeks are likely to set new production records as a result of stimulating news from the battlefronts.

If specific information about the battle performance of the fighting equipment they helped create is made available to plant workers in greater detail, the stimulus to arms production would be still greater.

Something more than a naval victory seems needed, however, to prevent such situations as the exodus of considerable numbers of Michigan war plant workmen on deer-hunting expeditions. Conferences between union representatives and employers on how to keep deer-hunters on their factory jobs are not uncommon this month in Michigan. In other industrial areas there are other hard-to-handle causes for absenteeism.

In the United States, as in Britain and Canada, this question seems to be shaping up: "Should absence without cause from war work be made a punishable offense?"

AT Washington, and in most industrial areas, the manpower problem is getting more attention. One of the largest producers of war goods reports that manpower now rates with material as a major problem. Employers are being urged to draw up Manning Tables for use in asking draft boards to defer vitally-needed employees.

In approaching the place where it must budget manpower, the U. S. is simply following a road taken more hurriedly by all of the big industrial powers engaged in this war. How the 18-19 draft will affect plant manpower is hard to forecast. Training programs will be hard hit because they include many young men.

The Manning Table is simply an industry-wide job analysis intended to assure draft deferment to qualified workers for a period sufficient to train replacements; to assure the Army of all eligible men; to prevent friction between employers and draft boards. Employers armed with Manning Tables are likely to get fairer treatment from the boards. Turn to page 108 for full details about Manning Tables.

A longer work week—one somewhat closer to the 56-hr. week of the British—is being urged in some quarters. In others, appeals are being made for the elimination or stricter control of enlistments. (One of the largest war prime contractors reports that his losses of skilled workers are three by enlistment to every one by draft.)

In addition, West Coast employers believe that something special in the way of trouble is being cooked up for them by the rapidly-growing Kaiser enterprises. (For the story of the Kaiser Gold Rush, turn to page 78.)

THIS week indications that soon there may be some more steel for other than direct war uses were strengthening. Direct action on the steel distribution situation was taken last week by the WPB so as to assure complete utilization of all steel produced. Several "relief" cases are expected to be included in December steel quotas. These are: (1) Railroads are likely to get a greater tonnage of rails than expected, (2) barrel makers will find that their December tonnage will be heavier, (3) bolt and nut makers will find their supplies increased and (4) warehouses will get a greater share in December steel shipments.

Straws pointing to a possible steel surplus within six months to a year are now said to be due to the fact that PRP belatedly started to work in the current quarter. Some WPB officials say that there are excess tonnages in a number of shops where allotments made to the armed services and others have not been backed up with orders to the mills. Other factors figure in the situation, but PRP proponents at the WPB give the credit to Ferdinand Eberstadt, WPB vice chairman on programs.

"Eberstadt had enough nerve to cut programs back to conform to supply during the fourth quarter," one WPB official said. Cutting programs back punctured the balloon of priorities inflation, where government and private users in some cases received more steel than needed.

IN the current week there will be more steel to be distributed, since ingot production is now at 100 per cent of capacity, a half point above last week's level. Steel production in the Chicago area rose a half point to 102 per cent. Philadelphia output climbed a half point to 93.5 per cent, while Cleveland is up a half point at 99.5 per cent and Youngstown operations are a point higher at 101 per cent.

Steel-making in Birmingham jumped three points

to 98 per cent, Cincinnati climbed seven points to 103 per cent and melting operations in the Eastern Area rose seven and a half points to 107 per cent. Melting rates were unchanged at Pittsburgh, Buffalo and Wheeling.

In October pig iron production reached the highest point of this year, with 36 companies having 99.8 per cent of the total blast furnace capacity, producing 5,165,012 tons according to the American Iron and Steel Institute. For the first time in 1942, pig iron production last month was above 100 per cent of capacity, having reached 101.6 per cent against the average of 98.7 per cent for the first ten months of 1942. October production of ferro-manganese and speigeleisen was 71,596 tons compared with 47,539 tons in September and 65,966 tons in March, the previous high for 1942.

For latest figures on blast furnace production and capacity, see page 131.

BOTH pig iron and scrap supplies are somewhat easier for the steel plants. Temporarily, at least, some mills have been more "choosy" and are rejecting material which they were glad to get a few weeks ago. Others are discouraging remote scrap. Some companies which have been on a hand-to-mouth basis now have a few weeks' supply of scrap. Success of nation-wide campaigns to collect old metal went beyond expectations, providing stocks which to a large degree have not reached the mills, but which provide a hedge against a severe winter. Recent blowing in of blast furnaces, with others expected to be melting by spring months, figure strongly in an appraisal of the raw material supply for the steel industry.

Published reports that the steel business is definitely slowing down are denied in many areas. For at least one large producer, orders while declining, are still ahead of shipments.

While available steel for concrete bars is running far above current demand, and with a lumber shortage in prospect, interest is being shown in plans to build more than 14 hospitals, four large housing structures and some Army facilities with wood floors instead of reinforced concrete. Availability of steel reinforcing bars apparently calls for revision in WPB prohibitions on use of concrete bars in some buildings.

CMP Materials, Controlled Materials Bills of Materials, Explained

• • • The comprehensive nature of the new Controlled Materials Plan makes it imperative that every plant, contractor, individual and government agency, directly or indirectly affected, fully understands it.

The provisions covering bills of materials are important rght now. Responsibility for compiling a complete bill of materials for a procurement item, including all subcontracted parts, is vested in the prime consumer. Materials are defined to include even the scrap generated in manufacture. Bills of materials procedure is explained fully in this issue of THE IRON AGE starting on page 117.

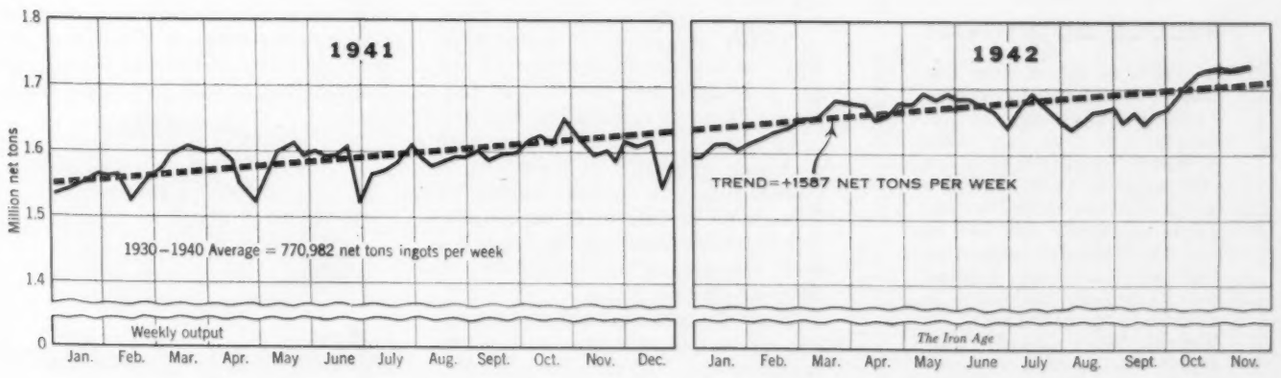
How the Controlled Materials Plan will be directed is described in this issue starting on page 114. Closer knit relationships will be necessary between the various government branches. Five operating bureaus have been set up. (Administrator of CMP is Harold Boeschenstien, Libby-Owens-Ford vice-president, with W. R. Skuce, G-E executive, as assistant.)

Basic aspects of the CMP were described in THE IRON AGE, Nov. 5, pages 141-144; the plan in detail was summarized Nov. 12, pages 74-76 and 129G and 129H.

MILLS are rolling their last schedules on light gage black and galvanized sheets with such material likely to be turned out in the future by non-integrated units only. The increase in tin plate production recently authorized was greater than expected. Warehouses are in a somewhat improved position since WPB has been issuing directives for warehouse shipments. Warehouse stocks still are unbalanced, especially in plates.

One mill operator comments that the steel normally used for reinforcing bars, being off-heats and not meeting chemical or physical specifications for other products, must meet only tensile requirements for reinforcing bars, and is not much good for anything but scrapping if reinforcing bars are not made.

The Iron Age



Steel Ingot Production by Districts Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	S.Ohio River	West	St. Louis	East	Aggregate
November 12	100.5	101.5	100.0	93.0	98.0	104.5	89.0	95.0	109.0	95.5	102.0	107.5	100.5	99.5
November 19	100.5	102.0	101.0	93.5	99.5	104.5	89.0	98.0	105.5	103.0	102.0	107.5	107.0	100.0

O E M Photo by Palmer

Final Examination

BEFORE STAINLESS GETS ITS WINGS

REDUCE ACCIDENTS!

In 1941, accidents were first cause of death among men from 22 to 38 years of age. The productive man-days lost were enough to build twice as many battleships as now possessed by the combined Allied Navies. These are losses that *can* be avoided. Warn your employees repeatedly not to take risks on or off the job—cooperate in every way possible with the National Safety Council's *War Production Fund to Conserve Manpower,* 71 Broadway, N.Y.

A GREAT DEAL of costly processing is done on stainless steel, to secure the physical characteristics and surface finish required for the particular war job it is to perform. But one day all the hot and cold rolling, heat treating, and pickling, grinding or polishing is completed, and bright sheets of Allegheny Stainless lie on protective layers of heavy paper, ready for final inspection and shipment to the war plants.

They're *right,* those sheets—flawless of surface and true to desired specifications. Only one essential remains: that they be used as carefully as they were produced—fabricated with an absolute minimum of rejects, spoilage, undue scrap, or waste in any form. ● Call on us for technical and fabricating data, or the services of our Technical Staff.

AL

STEEL FOR THE NATION'S WELFARE

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

A-8710 . . W & D

News of Industry

International News Photo

ROMMEL HUNTERS: Still under heavy fire by Axis artillery these armored cars of the British Eighth Army are shown racing across the desert near El Alamein in hot pursuit of Rommel's forces. Note the near hit on the armored car on the left.

Railroads, Barrel Plants, Warehouses To Get More Steel

• • • **Steel ingots** will not be stocked in this country, even though urgent war requirements will not require the total steel output later this year and early next year. Instead, as the steel situation eases, if it does, the WPB will take immediate steps to review and relieve any tightness in essential civilian and less urgent war needs.

That much was decided last week in Washington after a committee of steel leaders conferred with WPB at the latter's request on the question of balancing steel output with needs prior to the effectiveness of the controlled materials plan. The committee is known as the Advisory Steel Products Committee. It will act in an advisory capacity to the Iron and Steel Branch of the WPB and, in addition to regularly reporting conditions in the steel industry as to output and finishing operations, will take steps to work out a comprehensive plan to educate and initiate the fundamentals of the CMP so that when the time comes for formal application those involved will have a working knowledge of the plan.

Direct action on the steel distribution situation was taken last week by the WPB so as to assure the complete utilization of all steel produced. It is reported that several cases of relief are expected to be included in December steel quotas. The railroads are to get a greater tonnage of rails than was thought a few weeks ago. Barrel makers will find that steel tonnage to them will be increased to some extent in December shipments.

More important is the report that WPB will see that the participation of the warehouses in the steel supply will be greater for December than had been expected by the warehouses. Bolt and Nut makers will also find supplies to them will be upped.

All of these actions followed a meeting in Washington last week and are steps that will prevent any piling of ingots due to changes in the general distribution patterns. The reviewing of need for more supplies to essential civilian requirements was pointed out in THE IRON AGE last week. It is known that the whole problem of essential civilian needs will be scrutinized weekly or daily if necessary. When any change in the direct war requirements indicates an easier supply condition the WPB will immediately scan the needs of various industries engaged in essential civilian endeavors as well as less essential war needs.

There will be no chance that nonessential industries will get more steel supplies. On the contrary they may be subject to more drastic reductions. Only those industries which are engaged in important civilian undertakings necessary to keep the fighting forces in trim by keeping the home front geared to the battlefront can be assured that everything possible will be done to see that their production is kept going.

It appears that WPB has moved in a faster pace with promise of prompter action on matters which need expediting if they are to help win the war. That much was indicated last week when relaxations mentioned above were put into effect. Furthermore, it is apparent that a "new phase" of cooperation between WPB, armed forces, and industry has materialized.

RFC Permitted to Take Republic's Monroe Plant

Detroit

• • • **The Reconstruction** Finance Corp. was given permission in Federal Court here Nov. 13 to take over the Monroe, Michigan, plant of the Republic Steel Corp. Permission was granted under the terms of the Second War Powers Act.

The RFC moved to take over the plant, it was understood, after a deal to transfer it to a direct war producer fell through. It was understood that RFC would lease the plant to another firm, presumably to make aluminum castings and

other war products. Federal attorney John C. Lehr said the government action would place the plant on a full war production basis in the near future. Additional construction is said to be contemplated.

The Monroe plant, originally the Newton Steel Co., was set up to produce sheets for automotive use. Recent operations have been at a low level, with employment estimated to run between 200 and 300 men.

It was said that the plant would be leased by RFC as soon as an appraisal of the property is completed. Rumors in Monroe have said that the Aluminum Corp. of America had attempted to buy the plant.

Barge Canal Terminal Handles Much Pig Iron

Buffalo

• • • The Buffalo terminal of the New York State Barge Canal is jammed with boats as operators try to beat the approaching navigation deadline. Enjoying the best season in three years, the terminal has transshipped 36,172 tons of pig iron from Cleveland for movement to New York. Pig iron stands third in volume behind petroleum products and sulphur.

A PONTIAC VICTORY: Pontiac employees will be glad to know that this Jap bomber shown crashing with one motor shot entirely away was brought down by anti-aircraft guns of their manufacture.

WLB Sets Precedent On Anti-Migration Raises

Washington

• • • **The WLB, acting** for the first time under the new stabilization powers on a case of migration of workers, showed plainly that it was not disposed toward granting wage increases for the sole purpose of stopping migration at least in individual plants.

Such was the decision rendered to the Staley Mfg. Co. of Painesville, Ohio, and the Chemical Workers Union (AFL) refusing a 6c. an hour increase agreement which was designed to stop workers from going to a nearby magnesium plant for higher wages.

The board pointed out that to raise wages as a remedy for the manpower shortage would only tend to accelerate the spiral of inflation in opposition to the purposes of the new economic stabilization policies.

The recent industry-wide increase of wages for the copper miners was a measure to combat migration, but could not cause repetitive requests or inequalities because the whole industry was blanketed.

SECOND FRONT PORT: Through these portals came the Yanks to seize control of French Morocco in the Allied Nation's second front attack. This is the port of Casablanca, French Morocco, located in northwestern Africa. Part of the French fleet was destroyed off this port resisting the attack.

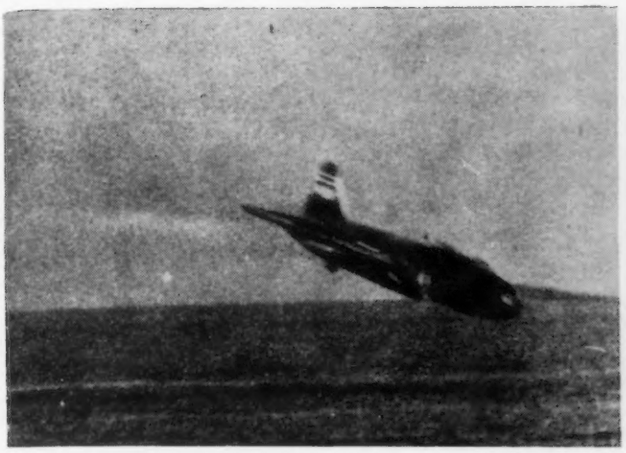
Press Assoc. Inc. Photo

Steel Shipped for Eastern Leg Of New War Pipe Line

Washington

• • • **The first shipment of 24-in.** seamless steel pipe for the eastward extension of the War Emergency pipe line is now moving from an Ohio mill of the National Tube Co. to strategic points along the eastbound right-of-way. The 215,000 tons of steel necessary for the completion of the line carry an AA-3 priority rating. The contract covering the first 360 miles of pipe required for completion of the Texas-East Coast line was let by War Emergency Pipelines, Inc., on Oct. 30, within 48 hr. of the allocation of steel for the extension, Deputy Petroleum Coordinator Ralph K. Davies said. The prompt conclusion of this contract, it was stated, permitted the pipe supplier to maintain uninterrupted fabrication at the same mill and with the same facilities. Pipe for the remainder of the 857-mile extension will be ordered at a later date.

Construction of the Texas-Illinois pipe line leg is hitting a pace of about five-and-a-half miles a day.



Meehanite Discusses War Subjects and Elects Officers

Pittsburgh

• • • **The first war** time meeting of the Meehanite Research Institute of America Inc., was held here November 5 and 6. Attended by over 100 representatives of Meehanite Foundries from the United States and Canada, the meeting featured recent researches on such subjects as: "Meehanite in the Production of Shell and Bomb Forgings"; "Manufacture of Cast Crankshafts"; Replacement of Brass and Bronze by Meehanite Castings"; and "Problems of Steel Replacement by Meehanite."

Officers elected for 1943 were president, Oliver Smalley, Meehanite Metal Corporation, Pittsburgh, Pa.; vice-president, H. B. Hanley, American Laundry Machinery, Rochester, N. Y.; secretary-treasurer, A. M. Galbraith, Meehanite Metal Corporation, Pittsburgh, Pa.

Plans for a continued sales promotional and advertising activity for 1943 were discussed and approved.

THIS IS BIZERTE: This port, located at the very tip of Tunisia on the Mediterranean, has now become the strategic city in North Africa. Heavy Allied bombings and off-shore shelling may soon reduce these fine buildings to rubble (if Bizerte resists), as happened at Bengazi and other ports earlier in the campaign. Bizerte is also the ideal jumping off place for the invasion of Italy or southern France.

International News Photo

Steel and Iron Output in Canada Dip in September

Toronto

• • • **Production of** iron and steel in Canada during September dipped slightly below the August total owing to the fact that Algoma Steel Cor., Ltd., Sault Ste. Marie, facing labor troubles, banked its blast furnaces and suspended steel making for a few days at the beginning of the month, while the shorter month also had some effect.

For the first three quarters of this year cumulative production of both pig iron and steel topped all previous records.

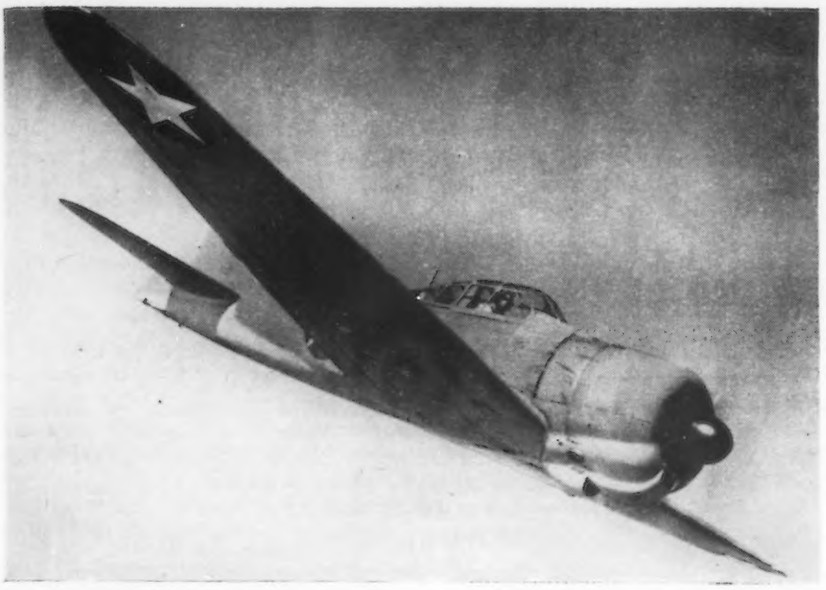
During September 7000 tons was added to Canada's annual rated capacity for producing castings, which brings the total now to 258,000 tons annually. There was no change in steel ingot capacity in the month, the rated total standing at 3,151,000 net tons annually, which pig iron capacity also was unchanged at 2,123,320 tons annually.

Production of pig iron during September amounted to 155,900 net tons compared with 162,578 tons in August and 126,168 tons in September last year. Cumulative pig iron production for the nine months ending Sept. 30, totalled 1,464,651 net tons, an increase of 38.3 per cent over the 1,058,520 tons produced in the same period last year.

Steel ingots and castings produced in September totalled 244,922 net tons, against 248,868 tons in August. For the first nine months of this year cumulative production of steel ingots and castings totalled 2,308,588 net tons, which is 17.5 per cent over the 1,958,940 tons reported for the same period last year.

AMERICAN ZERO: This Jap Zero plane forced down in the Aleutian Islands now bears the stars and stripes instead of the Jap's red disks. It was reconditioned and is being tested by the Navy. Most of its good features were found to have been copied from American planes and its sacrifice of armor makes it highly vulnerable to the heavy fire power of our fighters.

International News Photo



FORD FORT: Looking very much like a rolling fort this tank made entirely by Ford starts on its trial run. Every part of the tank including the armor plate was made in the Ford plant.

International News Photo

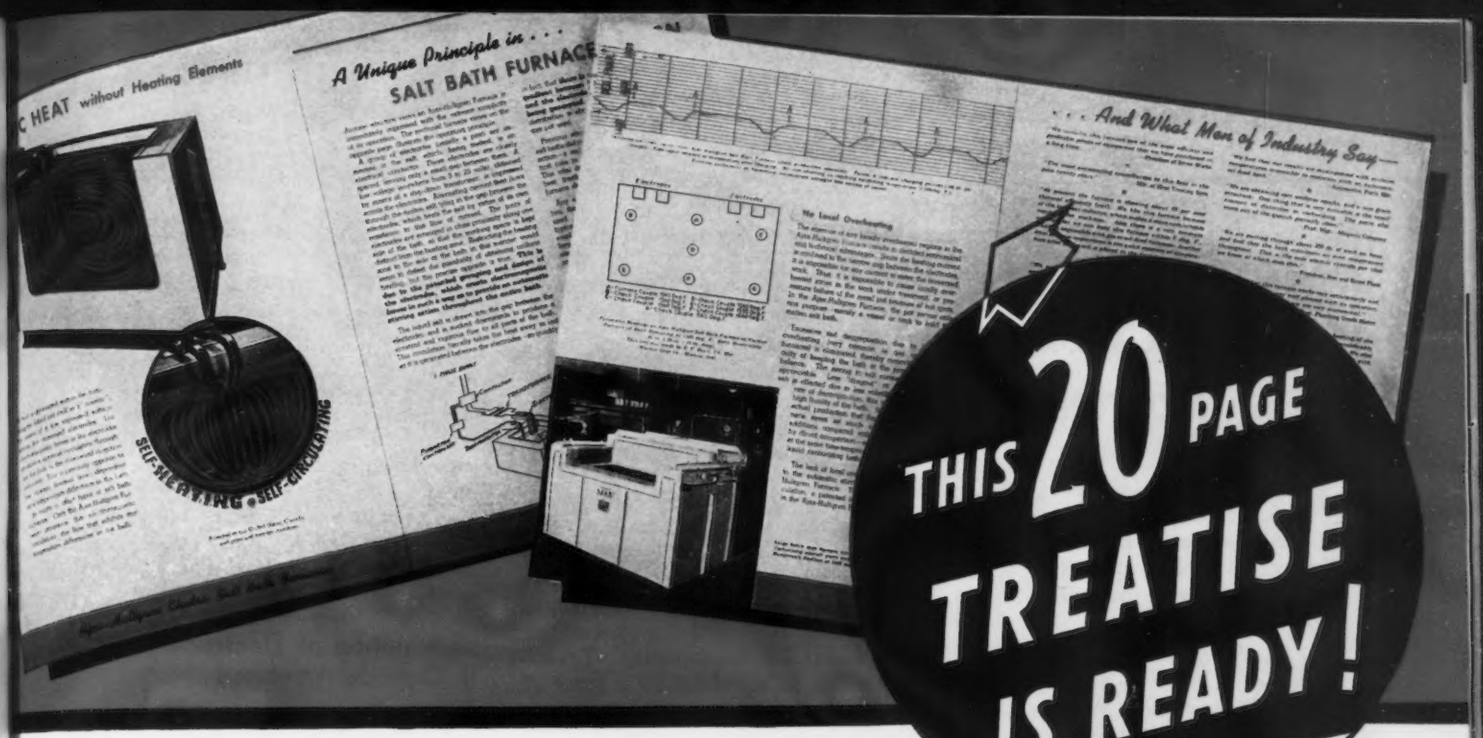
Canada Extends Steel Control

Toronto

• • • **New government** restrictions have been placed limiting the sizes and types of nails which may be produced in Canada. Many sizes of nails have been eliminated from production schedules, but most commonly used sizes and types remain on the permitted list. Production will continue on all standard sizes from 1 to 6 in. in common nails, but most special gages will be eliminated.

Future wire sales all will be under the direction of the Steel Controller and with the exception of a few of the smaller items, including nails, washers, bolts, etc., regulations have been introduced by the Department of Munitions and Supply, which make it compulsory for consumers to forward a copy of their order to the Steel Controller before it can be filled by the Canadian mills.

Pig iron was the first item to come under government control, and since has been followed by plate, sheets, bars and structural shapes.


C HEAT without Heating Elements
SELF-HEATING • SELF-CIRCULATING
A Unique Principle in . . .
SALT BATH FURNACE
. . . And What Men of Industry Say—
THIS 20 PAGE
TREATISE
IS READY!

"HEAT TREATMENT IN Ajax-Hultgren ELECTRIC SALT BATH FURNACES"

SUBJECTS COVERED

Basic Heat Treating Processes:
ANNEALING *(wire, bars, stampings, etc.)*
AGE HARDENING *(aluminum alloys)*
BRAZING
BRAZING AND CARBURIZING SIMULTANEOUSLY
CARBURIZING
CYANIDE HARDENING
DRAWING STEEL PARTS
HARDENING HIGH SPEED STEEL TOOLS
HEATING FOR FORGING
NEUTRAL HARDENING
SELECTIVE HEATING
TEMPERING STEEL PARTS

and

COSTS AND OPERATING PRINCIPLES:
Ajax-Hultgren internal (electrode) heating principle . . . Automatic circulation of the bath . . . Thermal efficiency compared to fuels . . . Pot life . . . Maintenance costs . . . Automatic temperature controls . . . Sizes, standard shipping dimensions, installation tables . . . Mechanized and Manual installations . . . Types of industry using electric salt bath furnaces . . . Performance reports . . . all are fully covered.

A great many executives are familiar with Ajax installations* for the standard liquid heat treating operations.

However, though over a thousand of these furnaces are in use, new high output processes developed exclusively by Ajax may be something of a revelation to many.

You will want to know something more about a furnace method which has been universally adopted by leading aircraft and armament makers for heat treating vital parts of engines, antiaircraft and machine gun parts, tanks, jeeps, army trucks, airplane structures, armor-piercing shot, high explosive shells, armor plate, steel cartridge cases . . .

There is up to date information in this publication which cannot fail to be of value to you or your staff. You may have it, without obligation, by writing:

AJAX ELECTRIC CO., INC. 900 FRANKFORD AVE., PHILA., PA.

***THERE'S AN AJAX INSTALLATION NEAR YOU!**

THE AJAX HULTGREN ELECTRIC SALT BATH FURNACE

ASSOCIATE COMPANIES:
AJAX METAL COMPANY, *Non-Ferrous Ingot Metal for Foundry Use*
AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heat-Treating*

Your Choice of a Scrap Broker is Important

The sale of Iron and Steel Scrap should be — and can be — as satisfactory and pleasant as any business transaction in your plant.

Be sure to choose a broker who can rightfully claim these qualifications—

1. A reputation for trustworthiness and responsibility.
2. A record of prompt payment and readiness to adjust differences without quibbling.
3. A willingness to give extra service — such as keeping customers posted on the best prices available, finding the best market for customer's advantage and advising on the technical problems involved.

We guarantee our customers these and other high standards of business relationships.

In our career of nearly 50 years as an iron and steel scrap broker we have built on these principles.

We solicit further opportunities to be of service in the movement of iron and steel scrap from industrial plants, railroads and scrap yards to steel mills and foundries.

The
CHARLES DREIFUS
Company

(Scrap Broker for Nearly Half a Century)

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Oliver Bldg.
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WORCESTER, MASS.
Park Bldg.
Worcester 6-2535

New Ore Mine to Be Lake's Largest Shaft Producer

Ishpeming, Mich.

• • • **The new Mather ore mine,** opened here recently by the Negaunee Mine Co., promises to be the largest producer of any shaft ore mine in the Lake Superior region.

The shaft has already been driven to a depth of 2100 ft. and the ultimate capacity is now being estimated at about 1,500,000 gross tons per year. An even deeper shaft is predicted when operations are expanded to capacity. Transportation is provided by a spur of the Lake Superior and Ishpeming Railroad which connects into the main line of the railroad only five miles away.

Ore stocking is handled from a permanent steel trestle with sufficient stocking area to handle about one million tons of ore. Although the stock pile is small now after only a short period of operation, it will be increased extensively during the coming winter months. Handling facilities and equipment have been exceptionally well provided.

The area around the mine has not as yet been thoroughly explored but sufficient investigation has been made to warrant a permanent, highly modern type of installation. Surface facilities were designed and built by the Austin Co., Cleveland. They include an air conditioned office building, a two-story machine room, a complete maintenance shop and warehouse and a modern change house for the workmen.

The mine is jointly owned by Cleveland-Cliffs Iron Co. and Bethlehem Steel Corp. but is operated solely by Cleveland-Cliffs.

Distribution of Electrodes In Canada Arranged

Milwaukee

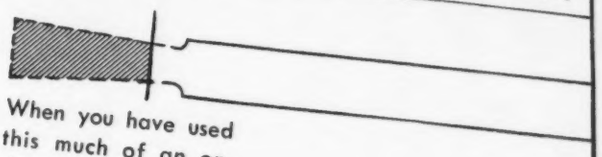
• • • **Canadian distribution** of P&H welders and electrodes manufactured by Harnischfeger Corp. is to be handled exclusively by the Canadian Fairbanks-Morse Co., Ltd.

Canadian Fairbanks-Morse maintains branch offices and warehouses in all important cities in Canada. Its main offices are at 980 St. Antoine Street, Montreal. It is expected that this arrangement will afford prompt and efficient service for all welding machines, electrodes for hard surfacing, air hardening steels and other special P&H welding equipment.

THE NEGAUNEE MINE CO.'s new Mather Mine combines a model $250,000 structure, designed and built by the Austin Co., to house surface facilities and a shaft that will rank high among the important ore producers in the Lake Superior region. The head frame of the mine extends 200 ft. above ground.

HOW TO SAVE TIME AND MATERIAL IN CUTTING-OFF OPERATIONS

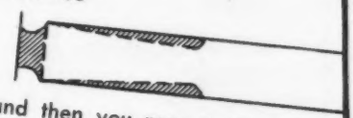
INSTRUCTION MANUAL



When you have used this much of an ordinary cut-off blade

Today's Important Lesson

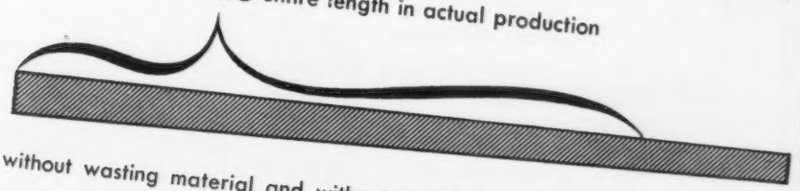
— — you must grind away all this to get new back clearance



— and then you repeat the same waste again — AND AGAIN!

With EMPIRE'S LUERS PATENTED CUTTING-OFF BLADES

you can use THIS entire length in actual production

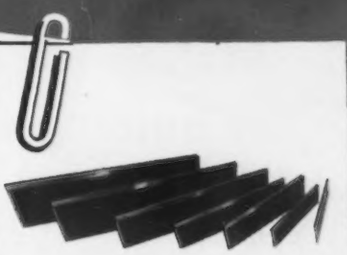


without wasting material and without wasting time in useless grinding.

The T Series is tapered* the entire length of the blade. A constant back clearance is thereby maintained regardless of the number of regrinds on the face (the only place where regrinding is necessary).

By using cut-off blades that eliminate this grinding for back clearance you not only save much valuable time which can be put to better use, but you also stop the waste of critical metal. You help to conserve steel.

*Blades, both tapered and parallel on the longitudinal cutting width, carried in stock.



EMPIRE TOOL COMPANY'S

LUERS PATENTED

CUTTING-OFF BLADES

are now in use on all these standard machines

•

Acme Gridley
Bardons & Oliver
Brown and Sharpe
Cleveland B Vertical
Cone Automatic
Davenport
Foster
Gisholt
Greenlee
Gridley
Libby
Midland
Millholland
Morey
National Acme
New Britain Automatic
Simmons
South Bend
Warner & Swasey

LUERS PATENTED CUTTING-OFF BLADES AND HOLDERS ARE MANUFACTURED BY EMPIRE TOOL COMPANY UNDER LICENSE ISSUED BY JOHN MILTON LUERS PATENTS, INC.

The Blades That Reduce Friction

EMPIRE Tool Co.

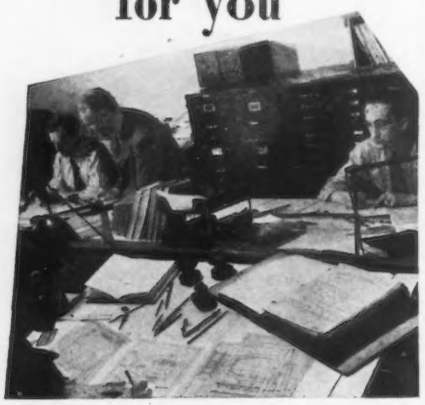
8788 Grinnell Ave. Detroit, Mich.

Sub-Contractors

here's

HELP

for you



TO help you get delivery *now* on essential steel fasteners, Oliver engineers are concentrating on methods of speeding production of special-purpose fasteners. Often, some slight change of design which does not affect the use of the bolt, will speed production by weeks and substantially lower your costs. Or perhaps the adaptation of one of our many standard bolts in place of these specials would not affect the application and might smash a serious production bottleneck in your plant. All special fastener inquiries are reviewed by Oliver engineers. Where alteration of your design would speed delivery, we offer our suggestions to you. These methods are *assuring quick delivery* to many contractors and sub-contractors who must not be delayed. This service is designed to speed your war production and Victory! Let Oliver help you with your steel fastener problems today!

This is a special purpose bolt that is difficult to produce quickly . . .

A slight design change speeded delivery, lowered cost, equaled utility.

OLIVER

IRON AND STEEL

Corporation

PITTSBURGH, PENNSYLVANIA

BOLTS . . . NUTS . . . RIVETS

STEEL FASTENERS

Ford Puts Non-Buckling Armor Plate on New Tanks

Detroit

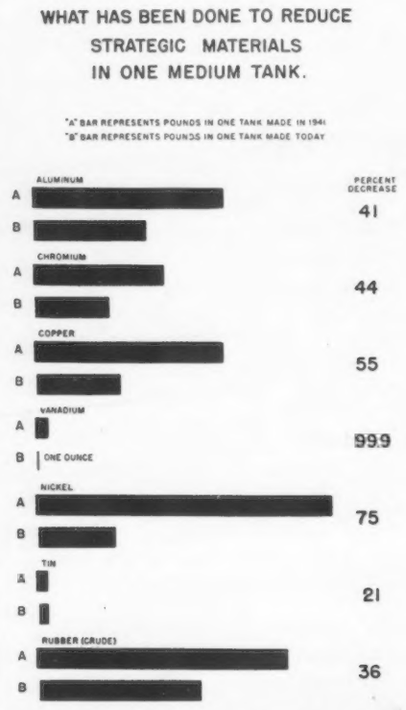
• • • **The Ford Motor Co.** is now in production on M-4 32-ton tanks, carrying armor plate made in the Ford Steel mills. Release of this information indicated that the Ford variant of the M-4 series is somewhat heavier than medium tanks made by any other producer.

It was said "that more than one assembly line is operating" in this production. Equipment and materials manufactured in Ford plants are being used for almost the entire construction of these tanks, with two factories, including one turning out tank armor plate, pouring finished parts and subassemblies into the final assembly.

Several Ford innovations are involved in the tank production. A new means being employed to produce non-buckling armor plate is said not only to eliminate the use of considerable material but also to sharply reduce production time.

It was said that approximately 85 per cent of the equipment used in one plant is the same which served to turn out motors for Ford cars. Salvage of this machinery was said to have been made possible by designing the tank unit to the manufacturing facilities already available. It was necessary only to shift machines and equip them with new fixtures.

Another production innovation was in production of the gun mount. Previously this unit was constructed of 27 fabricated parts. In the Ford tank it is turned out in three castings, cutting time by two-thirds.



ALLOY STEEL WAR: This chart tells how the Army Ordnance Department, user of 65 per cent of war steel tonnage in this country, is winning the "alloy steel war" against the Axis. It shows the critical material saving on a medium tank during the last year. Scarce ferro-alloys have been saved in manufacture of armor plate, anti-aircraft guns and many other war items.

October Construction Gains 70 Per Cent over Year Ago

New York

• • • **Heavy engineering** construction volume totals $691,979,000 for October and averages $138,396,000 for each of the five weeks of the month as reported by *Engineering News-Record.* The October average is 70 per cent higher than that reported for the corresponding five weeks of October, 1941, but is 22 per cent lower than the average for the four weeks of September, 1942.

On the weekly average basis, public work more than doubled its last year's mark, but is 22 per cent below last month. Federal construction tops a year ago by 208 per cent, while declining 24 per cent from a month ago. State and municipal volume decreases 67 per cent from October, 1941, but is 6 per cent higher than in September, 1942.

Private construction is 61 and 22 per cent lower, respectively, than in the corresponding month last year and in the preceding month.

Boost on Charcoal Iron

Washington

• • • **OPA has authorized** the Delta Chemical & Iron Co., Chicago, to increase its base price of charcoal pig iron from $28 to $30 at its Delta, Mich., furnace.

When the going gets tough!
Use these TOUGH FASTENINGS
BRASS
BRONZE
COPPER
EVERDUR
MONEL
STAINLESS
Desert heat, tropic sweat, arctic subcold, ocean salt—they're all alike to tough Harper Fastenings.
That's why these versatile workers have been drafted for service in tanks, ships, planes—wherever fighting equipment has to fight rust and corrosion, extra stress and strain.
WELL NAMED "EVERLASTING"
Harper Fastenings—bolts, nuts, screws, washers, rivets and special items—are made only of brass, bronze, copper, Everdur, Monel or stainless steel.
4320 STOCK ITEMS
Harper Service is unique for the tremendous stock, including many hard-to-get items—and special machinery for turning out off-standard items with unusual speed.
A REFERENCE ESSENTIAL
Harper's Catalog is actually an invaluable reference volume—80 pages, 4 colors, 193 illustrations, packed full of useful data. Simply ask for it on your company letterhead.
The H. M. HARPER Company, 2607 Fletcher St., Chicago . . . 45 Broadway, New York City
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EVERLASTING FASTENINGS

SENSATION IN '32

SALVATION IN '42

Victor Saw Works, Inc. advertisement on front cover of "American Machinist" for February 4, 1932.

Ten years ago, the first molybdenum alloy hack saw blade—introduced by VICTOR—was the sensation of the metal cutting industry, bringing tungsten high speed steel performance at half the cost.

Today, the molybdenum alloy blade is the salvation of the metal cutting industry, for today's VICTOR "Moly"* High Speed—ahead in steel analysis and heat treatment—is maintaining and accelerating production schedules for those accustomed to the use of other high speed steel blades.

Whenever you buy molybdenum alloy blades, be sure you get the original, genuine VICTOR "Moly"* High Speed, easy to identify by its all-over gold metallic finish.

VICTOR SAW WORKS, INC.
MIDDLETOWN, NEW YORK

Victor

To speed work and save blades give your men this fact-packed 20-page booklet on selection, use and care of hack saw blades and frames. Get it free from your supplier or write direct.

3184

*T. M. Reg.—Blades bearing the name "Moly" are made only by Victor Saw Works, Inc., and affiliated companies.

Lake Vessel Which Hit Reef Now Ready For Service

Cleveland

• • • **Following** one of the greatest salvage and ship repair jobs ever performed on the Great Lakes, the Pittsburgh Steamship Co.'s ore carrier, the E. J. Buffington, left the South Chicago yards of American Shipbuilding Co. on Nov. 8, ready again for ore service. The Buffington on June 21 piled up on Boulder Reef in upper Lake Michigan, loaded with 13,800 tons of ore. The 580 ft. freighter was bound from the upper lakes to Gary, Ind.

The pounding water cracked the ship's hull and she broke into three pieces and sank.

Temporary plates were used to join the three hull sections of the ship. It was pumped out and afloat within 15 days after it sank. From the reef, it was towed by the C. A. Black, a sister ship, to the South Chicago shipyards. After 139 days in the yard, during which time almost an entirely new bottom and new midsection were installed on the ship and the remainder of the boat completely overhauled, the ship sailed from South Chicago.

Emergency Plane Service Formed for War Plants

Cleveland

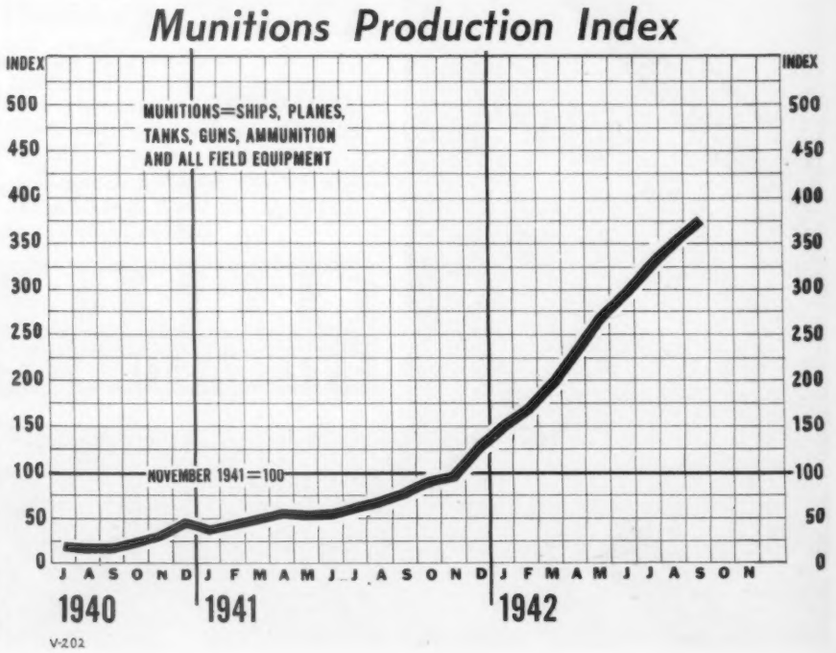
• • • **Emergency transportation** of material and personnel for war industries in the Cleveland area will be provided hereafter by the Ohio wing of the Civil Air Patrol, according to Major Earle L. Johnson of the Army Air Corps, national commander of the Civil Air Patrol.

The plan is to help prevent production delays by speeding the delivery of critical materials and parts. Participating war plants will be asked to bear the expenses of the service, which will also be available to official agencies of the federal, state, and local governments as well as the Red Cross.

National Steel Notes Dividend

• • • **National Steel Corp.** declared a dividend of 75c per share on its capital stock for the fourth quarter of 1942. The dividend is applicable to 2,205,667 shares and will be payable Dec. 2, 1942 to stockholders of record on Dec. 2.

MUNITIONS PRODUCTION INCREASES: WPB chairman, Donald M. Nelson in his fourth monthly report on munitions production this week said that War Production data for September showed an increase in four important categories: airplanes, Ordnance, Naval and Army vessels and merchant ships. Overall production increased 7 per cent over the August record and raised the munitions index by 24 points to 381. This production rate is estimated to be approximately four times that at the time of Pearl Harbor.



Tougher Steel...Bigger "Bites"...Faster Production

SUN LUBRICANT Saves Two Operations

Cuts Passes on Manganese Steel From Six to Four!

"Battle bonnets" — helmets that stop a high powered rifle bullet at six feet . . . weigh much less . . . provide greater overall protection . . . that's the kind of equipment our boys are getting today and faster than ever thanks to the aid of Sun Lubricants.

A few years ago cold rolling manganese steel from .093" to .0375" with another oil required six passes. Today, using Sun Lubricants as roll oils, this steel is rolled in only four passes . . . with a better finish, free from soft spots and is produced faster and more economically.

The same service . . . products . . . and research that are constantly making advances like this possible are available to you in your plant. Today, tomorrow, or whenever you need engineering advice or aid in applying the right petroleum product in the right place call in a Sun Oil Company Engineer — one of those Doctors of Industry. Let him show you the possibilities of more production through better lubrication. Write . . .

SUN OIL COMPANY • Philadelphia

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SUNOCO

SUN PETROLEUM PRODUCTS.. HELPING INDUSTRY HELP AMERICA

Standard . . .
the **RIGHT NAME**
in forgings

Good steel plus expert craftsmanship are responsible for Standard's 147 years of success in steel product manufacture. Today, as in the past, the proven quality of forgings by Standard is being maintained.

The dependability built into every product delivered to Standard's customers is safeguarded by rigid control of every phase of production from acid open hearth to finished forging. Expert chemists and metallurgists carefully analyze all materials . . . trained personnel takes pride in strict adherence to customer specifications . . . and Standard's modern plant offers the finest shop facilities for producing better steel products.

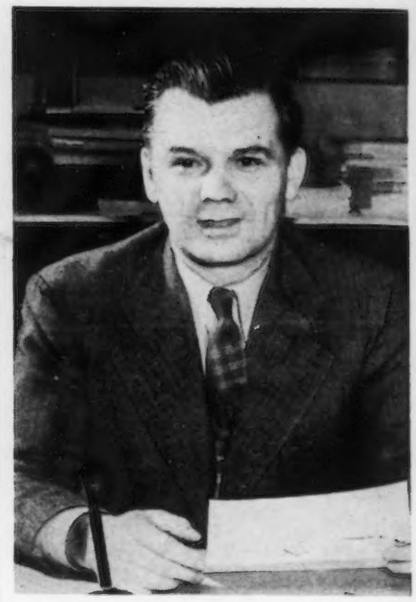
FORGINGS • CASTINGS • WELDLESS RINGS • STEEL WHEELS

STANDARD STEEL WORKS

DIVISION OF
THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

Aircraft Engineers' Group Works Out 30 New Standards

• • • **The National Aircraft** Standards Committee, made up of representatives of the engineering departments of the 27 prime aircraft contractors, held its fourth national meeting in New York, Nov. 9 to 13. Representatives from the WPB, the American Standards Association, the Society of Automotive Engineers and the Army-Navy Aeronautical Board conferred with the committee in working out about thirty standards for airframes and installations.



AIRCRAFT CHAIRMAN: Eric Dudley, Curtiss-Wright Corp., new chairman of the National Aircraft Standards Committee.

Actual quantities of each shape, size and alloy of each raw stock size of steel and aluminum sheet, bar and tubing used for designed and current production models and maintenance requirements were collected and correlated. Standards for the finish of machined surfaces were worked out in conjunction with SAE engine manufacturers' standards. Other projects involved control rod and cable parts, plain bushings, high strength machine nuts, extruded aluminum alloy and magnesium shapes.

Eric Dudley of Curtiss-Wright Corp., Buffalo, was elected chair-

man of the committee. John Cramer of Boeing Aircraft Co., Seattle, is retiring chairman. Other officers are David Craig of Grumman Aircraft Corp., east coast chairman; William Colcord, Kellet Autogiro Co., east coast vice-chairman; Gordon Waite, Consolidated Aircraft Corp., west coast chairman; Charles Sardou, Vultee Aircraft, Inc., west coast vice-chairman; Robert Ayer, Fleetwings, Inc., and Jack Wassall, Vega Airplane Co., executive engineers; and Eugene Norris, Aeronautical Chamber of Commerce, secretary.

Republic Takes Furnace Off; District Level Is 25 Stacks

Youngstown

• • • **Republic Steel Corp.** last week took its No. 5 blast furnace out of production for relining, thus reducing its operations to four out of five furnaces in blast. The furnace was kept in operation long past its normal life to permit the blowing-in of a new 1100-ton furnace recently completed in the district for the Defense Plants Corp. Consequently the area has noticed minimum effect and is still operating 25 out of 26 stacks.

Federal Scrap Sought

• • • **Lessing J. Rosenwald,** director, Conservation Division, announced Nov. 6, in connection with the expanding salvage program, that Federal agencies have been asked to launch an intensive drive to turn in all available metal items to the national scrap pile. Metal items to be considered in this drive include fences, railings, gates, grille-work and similar articles.

COMING EVENTS

Nov. 20—Galvanizers' Committee, Pittsburgh.

Nov. 24 to 29—National Chemical Exposition, Chicago.

Nov. 30 to Dec. 3—American Society of Mechanical Engineers, annual meeting, Hotel Astor, New York.

Nov. 30 to Dec. 4—National Exposition of Power and Mechanical Engineering, New York.

Dec. 1 and 2—American Society of Refrigerating Engineers, New York.

April 7 to 10, 1943—Electrochemical Society, Pittsburgh.

ROEBLING Wires
ROUND . . . FLAT . . . SHAPED
A FEW WIRES TYPICAL OF ROEBLING'S BROAD SPECIALTY PRODUCTION
READY-TO-USE WIRES THAT SAVE TIME AND TROUBLE!
ROUND WIRE TO SPECIFICATIONS
SHAPED WIRES
FLAT WIRE FOR GAS MASK CLIPS

Looking for ways to concentrate more of your facilities on final fabrication and assembly? Then let Roebling give you flat, round or shaped wires . . . that need no further processing to be incorporated into your Victory products.

Roebling Wire for Gas Mask Clips is a good example. It starts with carefully selected melts of steel. Carbon content must be held within close limits. Then, it is treated and rolled to exacting specifications of tensile strength, temper, dimensions and surface.

This is the kind of wire-making and wire-finishing job that Roebling takes in stride because we have the steel-making facilities, the man-power and custom production tools to handle it.

You can save man-hours and machine-time when you call on Roebling to meet your tough wire "specs". Prompt action on war orders.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY · Branches and Warehouses in Principal Cities

AS&W Launches Plant Safety Campaign

Cleveland

• • • **A vigorous safety** campaign is being launched in an effort to reduce lost time accidents and conserve manpower in all plants of the American Steel & Wire Co., as well as other subsidiaries of the United States Steel Corp. On Monday, Nov. 2, when the program was launched at the plants special programs were held. Outside speakers as well as company representatives presented the need for eliminating accidents in an effort to maintain 100 per cent industrial efficiency. Each employee will be given a pledge card to sign in which he promises to do all within his power to aid in the prevention of accidents.

23 Women Man U. S. Steel Hoop Shop At Youngstown

Youngstown

• • • **Twenty-three slack-clad** women are doing the work of men to relieve the labor shortage in the hoop shop of the U. S. Steel, McDonald Works in the Youngstown area. Not confined to sissy jobs these women are engaged in cutting strip, stacking, operating electric trucks and feeding cutoff machines. Others operate cranes over the oil dip baths, run coiling machines for bands.

A. C. Cummins, general superintendent, Youngstown district, expressed great satisfaction in the workmanship of the women and predicted far wider use of women soon.

How to Save

• TIME

• METAL

• MONEY

making STEEL SHELL CASES

If you contemplate the manufacture of steel shell cases, here are two ACP Products that will be of interest to you.

An immersion in ACP's CUPRODINE produces a dense, adherent coating of copper which substantially reduces wear on dies, cuts time over the electrolytic method, saves plating equipment, bus bars and copper electrodes.

ACP also offers—from its war-to-war experience in metal treatment and finishing—RODINE, the inhibitor used in pickling after annealing, which produces a smooth pickled surface and minimizes embrittlement. In severe draws, this latter is of great importance.

•

Other ACP Products that contribute to the war effort are: DEOXIDINE to prepare steel, aluminum and dural for painting; LITHOFORM for coating galvanized iron to hold paint; FLOSOL, an exceptional soldering flux; KEMICK for protecting metal surfaces even when heated red-hot, and other special chemicals vital to the better, cheaper, faster finishing of metals.

Whether or not there is an ACP Product available for your needs, you are invited to bring your problems here for study and recommendations on the proper chemicals and process to help you meet today's requirements. Write today outlining your problems.

AMERICAN CHEMICAL PAINT CO.

MAIN OFFICE AND WORKS
AMBLER · · · PENNA

ACP

CHEMICALS ACP PROCESSES

DETROIT, MICH., 6335 Palmer Ave., E.
CANADIAN BRANCH
WALKERVILLE · · · ONT

International News Photo

CAPTURED GENERAL: Disconsolate and tired looking, this picture shows Nazi General Ritter Von Thoma as he appeared after capture by the British Eighth Army in the African desert. General Von Thoma is a prize catch for Britain's Lieut. Gen. Bernard L. Montgomery, commander of the British forces in the desert.

October Production Breaks 50 Records for Republic

Cleveland

• • • **Republic Steel Corp.,** operating at an average of 111 per cent of capacity for the month, claims to have broken more than 50 records among them some world's records for steel production.

A new world's record in steel plate production was made at the 98-in. strip mill, where 85,597 tons of steel plate were produced. The previous record for monthly plate production was 84,000 tons.

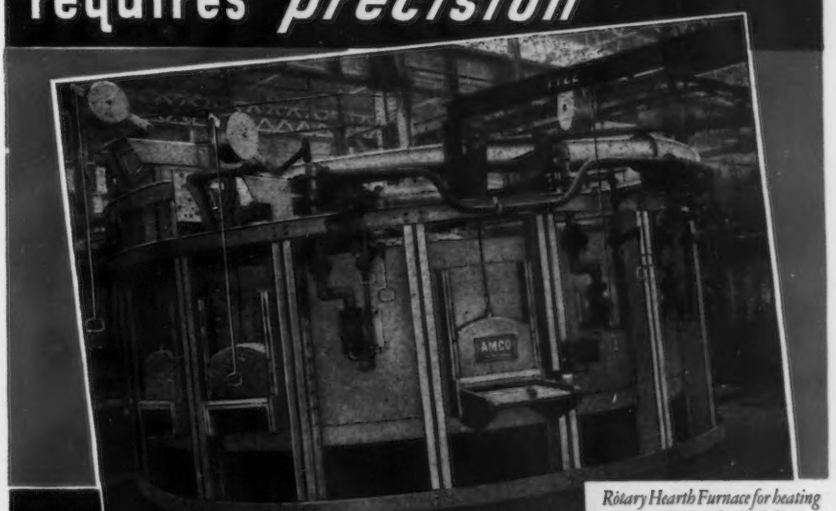
Other production records of Republic were broken during the month as the company's steel ingot output reached a new high and the pig iron record of 466,000 tons made in August was exceeded by the October output of 483,000 tons.

Steel ingot production beat the previous all-time record of 762,000 tons made in March of this year by 54,000 tons, bringing the corporation's new high up to 816,000 tons. Steel production for the first 10 months of this year is ahead 400,000 tons of production in any 10 consecutive months in the firm's history. Seven of Republic's eight open hearth departments made new records and all three of the electric furnace plants went over the top. Throughout the company, at least 50 important monthly production records were broken according to C. M. White, vice president in charge of operations.

International News Photo

NAZI SCRAMMER: When Lieut. Gen. Bernard L. Montgomery says scram to the Nazi in Africa they scram. At least that is the way it is going today. The British Eighth Army, backed with Yankee airmen, RAF and plenty of American made tanks has announced full flight of the enemy and possible annihilation.

Heating ordnance materials requires *precision*

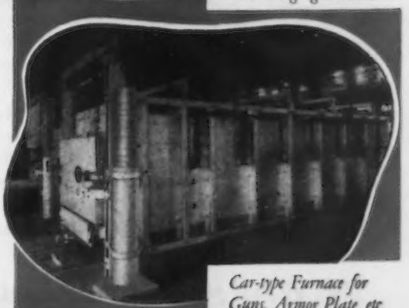


Rotary Hearth Furnace for heating all sizes of billets for shell forgings

AMCO FURNACES

..have successfully met this vital need

Gun Forging Furnace



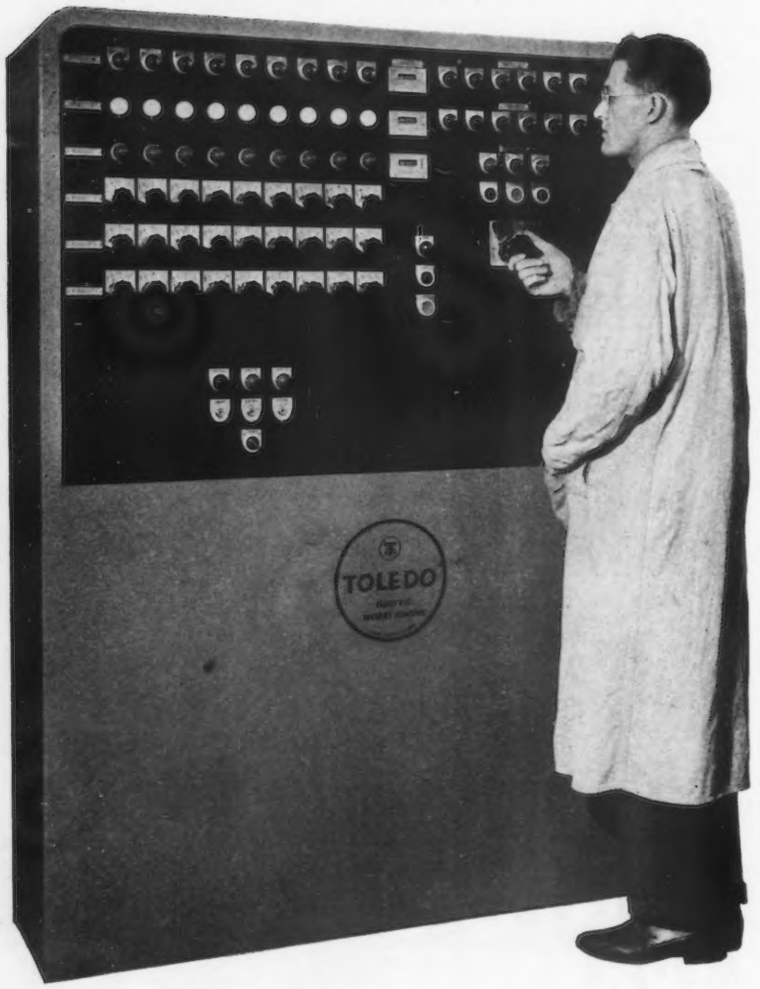
Car-type Furnace for Guns, Armor Plate, etc.

The heating of shell and gun forgings calls for *uniform temperatures!* AMCO FURNACES are modern versions of *designs proved in actual service*...the acid test for such important operations. Write for details on the complete line of AMCO Furnaces, one of which will no doubt serve your particular purpose!

The AMSLER-MORTON COMPANY
FULTON BUILDING • PITTSBURGH, PA.

Weighing

THE WAY TOLEDO DOES IT!



● This man is weighing 9 different ingredients that go into 3 furnaces of an alloy steel plant. He could just as well be controlling the batching operation of a glass plant... a chemical plant... or any other type of plant where batches are proportioned by weight.

The operation is made simple, fast, accurate and completely automatic by Toledo Scale control. Toledo Hopper Scales are set to pre-determined amounts for each ingredient. From there on Toledo automatic controls take over. Scales are electrically interlocked with one another and with related equipment. Accurately weighed batches may be carried away on conveyor belt. Rapid accurate operations with no chance for human error.

Toledo has solved countless problems in weighing, balancing, force-measuring and counting. Look to Toledo for the answer to *your* weighing problems. Write for complete information. Sales and Service in 181 cities in U.S. and Canada.
Toledo Scale Company, Toledo, Ohio.

IN WAR—AS IN PEACE

INDUSTRY LOOKS TO TOLEDO FOR ALL TYPES OF SCALES

C-I Sets New Peak in Iron and Steel Production

Pittsburgh

• • • **Furnaces of** Carnegie-Illinois Steel Corp. in the month of October produced more iron and steel than at any time in the history of this U. S. Steel Corp. subsidiary.

With individual all-time records, 6 blast furnaces and 3 open hearth shops in the Pittsburgh District of Carnegie-Illinois contributed greatly to the production of 1,460,-102 net tons of iron and 1,936,489 net tons of steel ingots and castings.

Record-breaking blast furnaces in the Pittsburgh District are the No. 1 and No. 3 stacks at Clairton, Isabella No. 1 and No. 3 and Duquesne Works' Blast Furnaces No. 2 and No. 5.

In the steel-producing division, open hearth shops contributing individual all-time records in the Pittsburgh District are located at Duquesne Works and the Lorain Division in Johnstown.

Carnegie-Illinois steel men, harvesting 22 all-time records in furnace production alone, exclusive of all rolling mill operations, made it possible for the company to maintain melting activity at well over 100 per cent throughout the month.

Republic's Sponge Iron Plant Slated for Warren

Cleveland

• • • **From four to six months'** construction will be required before Republic Steel Corp.'s new sponge iron plant will be in production. It is now expected that it will be erected at Warren, Ohio, instead of Youngstown, because supplies of desulphurized coke oven gas are available at Warren, whereas a desulphurizing unit would have to be built at Youngstown which would cost considerable money and delay completion of the unit.

While the plant is experimental, it is hoped that some one hundred tons of sponge iron can be obtained from it daily. This product to be used as non-contaminated charging material for electric furnaces. Sponge iron will run about 80 per cent iron made from New York magnetic ores which when concentrated run about 68 per cent iron.

October Output By J. & L. Smashes Records

• • • **October** was the greatest month for production and shipment of steel in the history of Jones & Laughlin Steel Corp., it was announced by President H. E Lewis.

"The J. & L. works in Pittsburgh, Aliquippa and Cleveland working 100 per cent on war orders produced a greater tonnage of steel products than ever before in any month," Mr. Lewis said. "Total shipments for the three works likewise exceeded their previous records. Records such as these are possible because of the hearty cooperation of all employees."

Forty-five new records were established by the various departments of the three works. All time high records were established for production of pig iron and steel ingots as well as by the blooming mills. One of the latter, the 44-inch blooming mill at Aliquippa works established a record, rolling 161,074 net tons of steel ingots in October or 143,363 tons of blooms and slabs. Many of the finishing mills and departments also broke their best previous records.

U. S. Steel Betters September Finished Steel Record

• • • **Shipments of finished** steel by the U. S. Steel Corp. for the year to date were highest in the corporation's history and for October totaled 1,787,501 net tons which bettered its September shipments by 83,931 net tons. Compared with shipments for the same month in 1941, October shipments were slightly lower by 63,778 net tons.

Shipments for the year to date totaled 17,548,977 tons compared with shipments of 16,988,715 for the first ten months of 1941; an increase of 560,262 net tons.

Stack in South Down

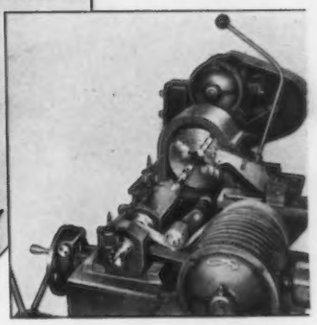
Birmingham

• • • **A Southeastern** blast furnace has been taken out of production for relining. This is the first time the furnace, built in 1914, ever has been completely relined. It is expected to be back in blast in a month to six weeks.

Sav-way
MULTI—PURPOSE
INTERNAL
GRINDER

Grinds ¼ to 18″ diameter holes, up to 9″ deep, straight or tapered. Sav-way grinder offers greater flexibility and will handle a wider range of work than has heretofore been possible on any one machine. Sturdily constructed throughout and suitable for both tool room and production grinding. "Bulletin MI" giving complete specifications sent on request.

Representatives throughout the U. S. A.



Looking down, from grinder head end.

Looking from headstock end, guard removed; note step pulleys providing various work head speeds. Headstock may be slid crosswise any desired distance up to six inches.

Front, angle view, work in chuck. Headstock graduated thru 180 degree.

Sav-way INDUSTRIES
★ Machine Tool Division ★
4867 EAST EIGHT MILE · DETROIT, MICHIGAN

Easier Work • Less Fatigue • No Production Slumps = 50% Less Assembly Time with Phillips Screws

Take a man who is being asked to put his "all-out" effort into assembly work.

You have been giving him slotted screws. Did *you* ever try to *speed up* using slotted screws? It's just inviting trouble, that's all; if you aren't slow and cautious, you'll end up with split screw heads, screwdriver scars and loose assemblies.

But give that fellow *Phillips* Screws and watch him go — particularly if he was using a hand driver before. With Phillips he can use power drivers — electric or pneumatic — for there's no danger of the driver point escaping from the screw recess. It's just a matter of . . . point the driver . . . and let her go. Phillips Screws drive straight automatically and can be "rammed home" without danger of the heads splitting.

No wonder a changeover to Phillips makes such a difference in output — quality — and employee morale. And the big saving in time also means an average of 50% saving in *cost*.

Write to any of the firms listed below for further facts.

PHILLIPS RECESSED HEAD SCREWS GIVE YOU 2 for 1 (SPEED AT LOWER COST)

WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS • SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N.H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N.Y.
Pawtucket Screw Co., Pawtucket, R.I.
Pheoli Manufacturing Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N.Y.
Scovill Manufacturing Co., Waterbury, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N.H.

U. S. Steel Seeks to Merge Its Railroads On Books

Washington

• • • **Application has been** made to the Interstate Commerce Commission by the United States Steel Corp. for authority to acquire direct control of the corporation's 11 railroads through purchase of their capital stock from subsidiary companies. The corporation said that the proposed purchase would simplify the corporation's corporate structure, and result in tax savings to it and its subsidiaries because the dividends on the railroads' stock will pass direct to the applicant rather than through subsidiaries. It is proposed to take over the stock for amounts carried on the books of present holders, the application said, because "there is no readily ascertainable market value."

The railroads involved are: Birmingham Southern; Carbon County; Connellsville & Monongahela; Donora Southern; Etna & Montrose; Hannibal Connecting; Johnstown & Stony Creek; McKeesport Connecting; Newburgh & South Shore; Northampton & Bath; Youngstown & Northern.

Canada Full Member Of Production Board

Ottawa, Canada

• • • **Canada has become** a full member of the combined Production and Resources Board, and will be represented on the Board by C. D. Howe, Minister of Munitions and Supply. Mr. Howe will be an associate on the board with Donald Nelson, chairman of the War Production Board, representing the United States, and Oliver Lyttleton, British Minister of Production representing the United Kingdom.

Ford Completes First P&W Engine Contract

Detroit

• • • **Ford Motor Co.** has completed its first War Department contract for Pratt & Whitney 18-cylinder radial air-cooled engines. Several thousand engines were involved in this initial contract, and work is proceeding on subsequent orders. Indicative of the magnitude of the assembly job is the fact that each engine contains 1,136 separate units and 10,164 parts.

Operate your drill presses and radials

to capacity

with Apex Safety Friction Tapping Chucks

Guaranteed to minimize tool breakage . . . save time and materials . . . and help inexperienced operators produce more, faster.

In every detail, Apex safety friction chucks are *right*. Made of finest material for the job, precision built throughout. Easy to adjust, and once adjusted, maintain proper tension over long periods. End thrust set up by tapping or pressure exerted by the operator does not affect friction setting. Friction disc element can be replaced quickly and at low cost when necessary. Used for tapping thru and bottom holes, drilling, reaming, stud setting, nut setting, spot facing, counterboring . . . wherever tool is apt to break. Shanks supplied for all requirements. Tap capacities up to 3". Considering today's conditions, reasonably good deliveries are obtainable.

How to save time on orders: Make sure you give type and tool numbers. If non-standard tools are called for, make a drawing or sketch, or give complete specifications. This will insure prompt handling of your order and prevent possible delay for lack of information. Write for complete catalog of Apex Production Tools.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of friction chucks, quick change chucks, positive drive chucks, vertical float tapping chucks, semi and full floating tool holders, stud setters, screw drivers, power bits, universal joints, plain and universal joint socket wrenches.

Manning Table Control of Draft Urged to Maintain Labor Force

• • • **Selective Service** headquarters announces that the "Manning Table Plan" was soon to be put into effect to assure the orderly release of skilled manpower from industry to the armed forces and at the same time held out this plan as the salvation of industry for maintaining its skilled workers for the period during which they were actually irreplaceable.

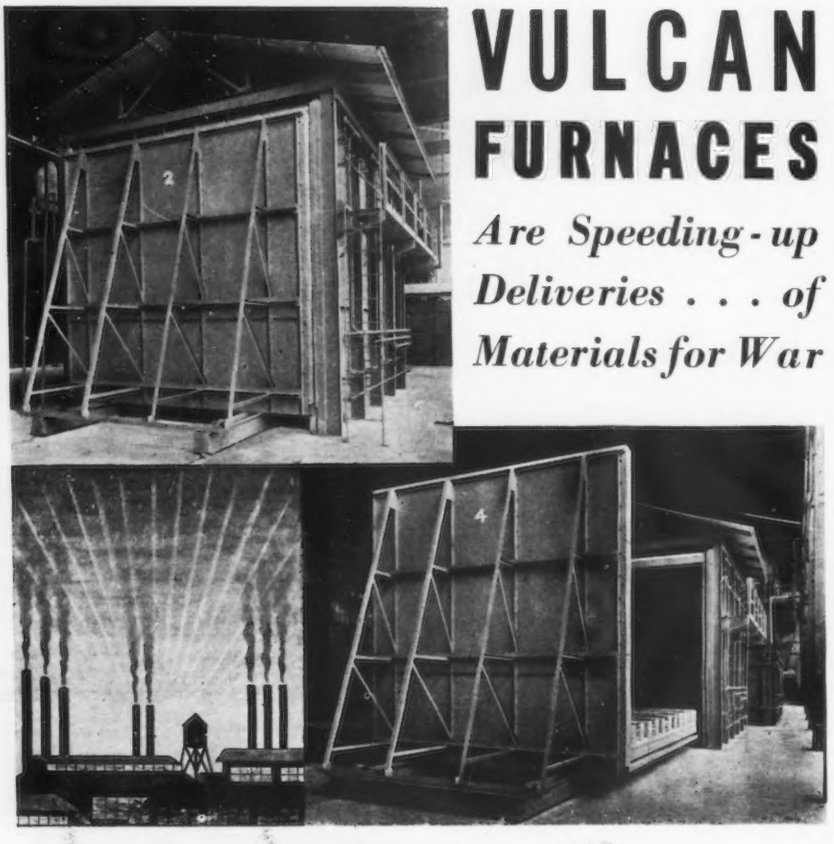
The plan, briefly, is a thorough job analysis of every occupation represented in a plant, outlined in such manner that the replaceability of personnel for any particular job, is plainly shown in time required. The purpose of such job analysis is to guide draft boards in making decisions on qualifications for deferment of applicants on a more substantial basis than an oral or quickly composed job-description by the applicant or his employer.

This will aid industry by assuring fair and adequate decisions by draft boards in the future and will aid the causes of the armed forces by assuring the services of every able-bodied man in America of draft age whose occupation is not more essential to prosecution of the war than his employment in the Army.

Voluntary comments which were received in the recent manpower survey conducted by THE IRON AGE *disclosed in many instances that complaint was deserved in many sections of the country concerning the decisions being made by draft boards as to who was eligible for deferment and who was not. Several reporting stated that they had lost many important, highly skilled workers to the draft and had been refused deferments for them while common laborers of equal eligibility were left to carry-on production if any. At least one of these plants reported the fact that while this condition occurred within their plant, they were engaged 95 per cent on Navy orders.*

Beyond the need for restraint on free enlistment in the armed services, the Manning Table Plan appears to be one of the first substantial contributions to the manpower problem. Its first objective is to enable industry to draw a clear picture of its employment needs by presenting a thoroughly integrated job analysis of every job in its plants—plant by plant—without regard for the individual who holds the job and with prime consideration for the period of time required to replace workers in each individual job. This is an analysis of jobs—not men. While this sounds like a ponderous job, it is often found that an entire plant may consist of only a handful of individual jobs with a hundred men doing each of the different job classifications.

The second objective of the plan is to correlate the job analyses from all plants for the purpose of forming a complete inventory of manpower requirements in industry and to reveal the need for



VULCAN FURNACES

Are Speeding-up Deliveries . . . of Materials for War

VULCAN Furnaces incorporate principles of design, construction and control that insure a considerable reduction in the heating-holding-cooling time for all heat treating operations . . . an important reason for their installation in major war production plants.

Above are shown two of a group of large Vulcan Furnaces recently installed in an east coast plant producing equipment designed to help our Navy **"speak with authority."**

Custom-built Furnaces for Annealing, Normalizing, Stress Relieving and Other Heat Treating Operations; Forging, Melting and Special Heating Work. Write for information or ask to see representative.

VULCAN CORPORATION
NORTH 18TH & CHERRY STS., PHILADELPHIA, PA.

Double-end TOMAHAWKS *.....do Double duty.....*

When ordering special forming tools it is frequently a good idea to buy them double-end. You can thus get two tools in one, save precious high speed steel and double the life between grinds.

Just turn the tool around the first time it needs sharpening.

Such tools also reduce grinding time and cost, since it takes less time to grind both ends of the tool at one time than to grind each end separately at different times.

It is not always possible to use double-end forming tools of course. You want to be sure that your tool support will protect the other end of the tool.

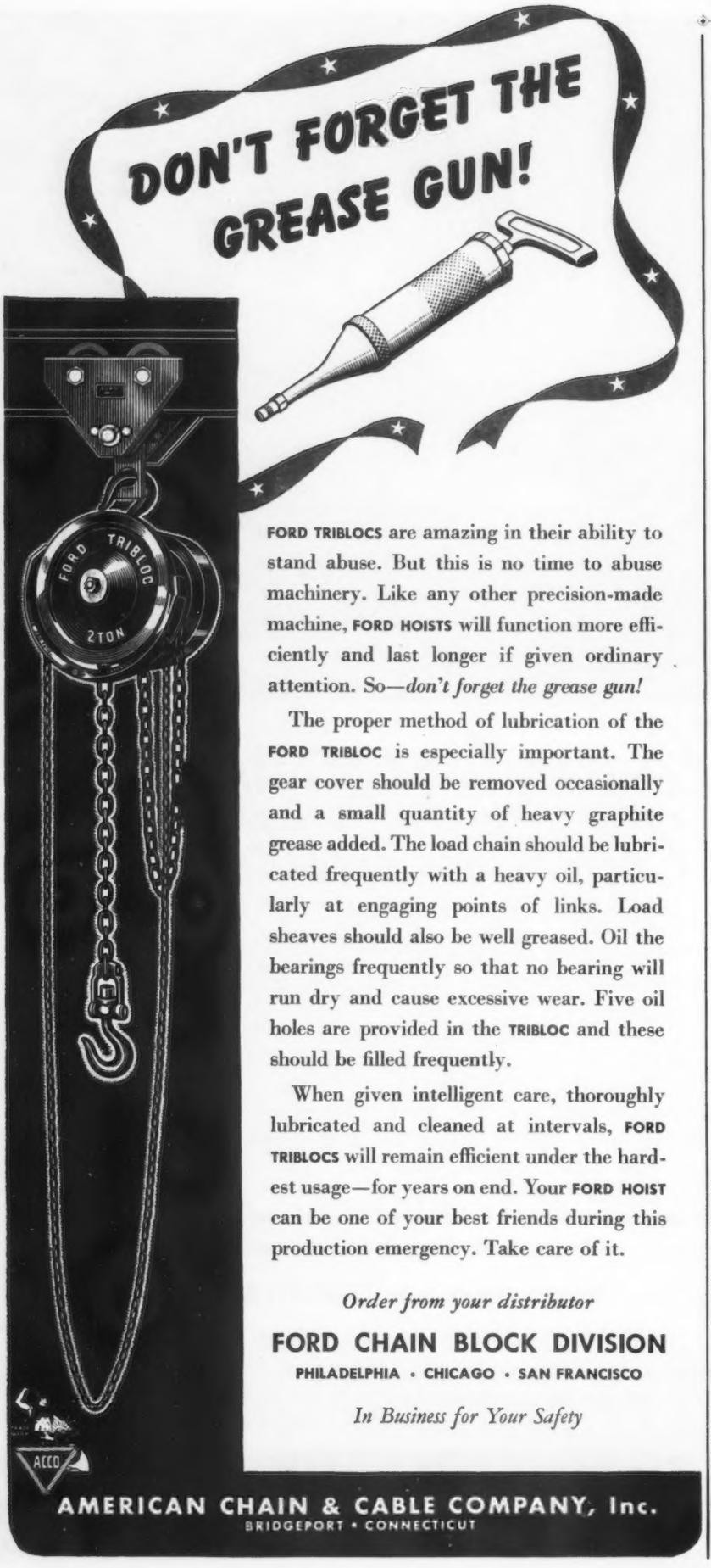
But it's worth looking into. There are many such **TOMAHAWK** tools in effective use today.

Send for "Streamlined" Catalog No. GT-42 on your company letterhead.

GENESEE TOOL COMPANY

FENTON, MICHIGAN

★ Registered Trade Mark



FORD TRIBLOCS are amazing in their ability to stand abuse. But this is no time to abuse machinery. Like any other precision-made machine, **FORD HOISTS** will function more efficiently and last longer if given ordinary attention. So—*don't forget the grease gun!*

The proper method of lubrication of the **FORD TRIBLOC** is especially important. The gear cover should be removed occasionally and a small quantity of heavy graphite grease added. The load chain should be lubricated frequently with a heavy oil, particularly at engaging points of links. Load sheaves should also be well greased. Oil the bearings frequently so that no bearing will run dry and cause excessive wear. Five oil holes are provided in the **TRIBLOC** and these should be filled frequently.

When given intelligent care, thoroughly lubricated and cleaned at intervals, **FORD TRIBLOCS** will remain efficient under the hardest usage—for years on end. Your **FORD HOIST** can be one of your best friends during this production emergency. Take care of it.

Order from your distributor

FORD CHAIN BLOCK DIVISION

PHILADELPHIA • CHICAGO • SAN FRANCISCO

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

training programs, upgrading and utilization of women and slightly handicapped workers and as a means of foreseeing future labor needs.

The plan, which was originated jointly by the War Manpower Commission and the Selective Service, is voluntary at present and is believed to be one which will receive such instant approval that compulsion will not be required. It was pre-tested experimentally in plants of Carnegie-Illinois Steel Co. but worked in conjunction with the American Iron and Steel Institute in its testing and in numerous other plants including American Locomotive, Briggs Mfg. Co., and Eastman Kodak.

The workings of the plan are neither complicated nor burdensome. The employer starts by obtaining and filling out a Manning Table application which is issued by the regional director of WMC. On approval of the application the WMC director furnishes five copies of the Manning Table for each plant to be surveyed, replete with instructions for use. The plant job classification is conducted according to the instructions supplied with the Manning Chart and the charts are returned to the WMC regional director who retains one copy, sends one copy each to the state director of Selective Service; the area director of the United States Employment Service and to WMC, Washington.

Next step, is that the Manning Table must receive the approval of the state director of the Selective Service who in turn issues a State Acceptance Number and stamp which the employer later uses to prove the validity of the Occupational Classification Affidavits which are filed to indicate the replacement time required for each employee.

After an employer's Manning Table, covering all job classifications in his plant, has been validated he is furnished with Occupational Classification Forms which are to be filed with the local draft board, bearing the acceptance stamp, showing the time required to replace each employee.

There are two types of this form. Form 42A is for all employees within the draft age limits for whom occupational deferment is currently required. This form is claimed to supersede any

Where to Write For the Manning Table Application

To obtain copies of the application for Manning Table forms, the first step in the plan, address your correspondence to:

REGIONAL DIRECTOR, WAR MANPOWER COMMISSION

at the regional office nearest to you. Complete addresses of all of the WMC regional offices are listed below.

Region I—10 Post Office Square, Boston (Temporary).
Includes the states of Maine, New Hampshire, Vermont, Connecticut, Rhode Island and Massachusetts.

Region II—Room 2240, 11 W. 42nd St., New York.
Includes the entire state of New York.

Region III—750 Suburban Station Bldg., Philadelphia, Pa.
Includes the states of Pennsylvania, Delaware, New Jersey.

Region IV—c/o NYA, 2145 C St. N.W., Washington, D. C. (Temporary).
Includes the states of Maryland, Virginia, West Virginia, North Carolina and District of Columbia.

Region V—521 Union Commerce Bldg., Cleveland.
Includes the states of Ohio, Kentucky and Michigan.

Region VI—c/o Social Security Office, 105 W. Adams St., Chicago.
Includes the states of Indiana, Illinois and Wisconsin.

Region VII—1630 Candler Bldg., Atlanta.
Includes the states of Alabama, Florida, Georgia, Mississippi, South Carolina and Tennessee.

Region VIII—c/o Social Security Office, Midland Bank Bldg., Fourth and Second Sts., Minneapolis.
Includes the states of Minnesota, Iowa, North Dakota, South Dakota and Nebraska.

Region IX—414 Dierks Bldg., 1006 Grand Ave., Kansas City, Mo.
Includes the states of Missouri, Arkansas, Kansas and Oklahoma.

Region X—Post Office Box 597, Austin, Texas (Temporary).
Includes the states of Texas, Louisiana, New Mexico.

Region XI—728 Patterson Bldg., Denver (Temporary).
Includes the states of Montana, Wyoming, Idaho, Utah and Colorado.

Region XII—245 Furniture Mart Bldg., San Francisco.
Includes the states of California, Arizona, Oregon, Nevada and Washington.

deferment requests which might have been made previously and will serve as the sole basis of decision. This form is not required for men having wives and children or children with whom they maintain a bonafide home under present rulings.

Form 42B is reserved for registering men who have such depen-

EC&M Presents

The PERFECT SOLUTION to the A-c BRAKE PROBLEM

NO
- laminated magnets or plungers
- destructive hammer-blow
- A-c chatter
- coil burn-out due to shoe-wear affecting air-gap
- motors, gears or pumps

FOR CRANES, HOISTS and MACHINERY

The well known EC&M WB Brake for d-c service is now available for operation on a-c circuits by the addition of a compact rectifier-unit. When used with magnetic control, the rectifier equipment is usually combined with the motor control panel.

This is a proven system of braking with several hundred already in successful operation. It allows high current for *fast release,* reduced holding current to give *fast* brake setting. And has these advantages:—*accurate inching*—has *hand release*—*solid* cast-steel *magnet* and *armature*—*short* armature-*movement*—thick *moulded* brake blocks—and all the advantages of the top-ranking WB Brake for d-c applications.

New Bulletin 1006 gives complete facts on EC&M "WB" Brakes for a-c motors. Write for a copy today.

THE ELECTRIC CONTROLLER & MFG. CO.
2700 EAST 79th STREET CLEVELAND, OHIO

Please send me Bulletin 1006.
Name .....
Company .....
Address .....

Now--BRAKES for A-c & D-c by EC&M

Why Manganese Steel Sheaves *Increase Service Life* of Wire Rope

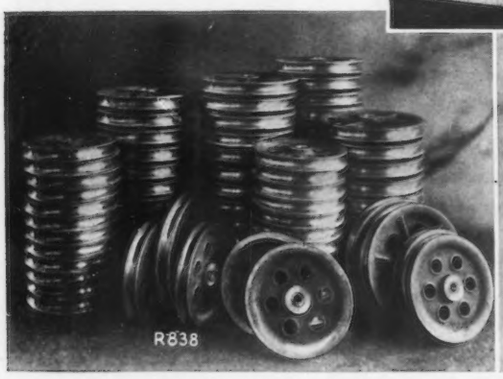
The published recommendations of the producers of wire rope contain much valuable data concerning sheave and groove dimensions, regrinding grooves to remove corrugations, and the sheave metal least destructive to the cable. Most of them give 13% manganese steel the highest rating. When a sheave groove is soft enough to score, microscopic splinters are produced that enter the rope strands, forming a highly destructive abrasive compound with the lubricant.

Manganese steel sheave grooves are not subject to this objection to nearly the same extent as those in ordinary iron or steel sheaves. The surface metal quickly work-hardens and polishes under friction and pressure, reducing cable abrasion to a minimum. In fact, the user of 13% manganese steel can generally expect a 25% longer life from his wire rope.

The body metal of the sheave is extremely tough so that breakage under shock or stress is seldom experienced. In the most difficult services manganese steel sheaves have a sufficiently longer life than ordinary wheels to justify their higher cost, without regard to the additional saving in wire rope consumption referred to above. Some typical Amsco manganese steel sheaves are pictured here:

Double groove wheels (R-727) for a steel plant ladle crane hoist; sheaves (with graphite bronze bushings pressed in) for use in tackle blocks and on steering gears on coastal vessels (R838), and sheave or closing wheel for 7 yd. dredge clamshell (R809).

Other types of sheaves, wheels, rollers, sprockets and gears made of "the toughest steel known" are shown in Bulletin 842-WS, which also gives much information concerning the properties and uses of manganese steel. May we send you a copy?



Amsco
AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO
OFFICES IN PRINCIPAL CITIES

Genuine Manganese Steel, "The Toughest Steel Known"
Chromium-Nickel Alloy Castings for heat and corrosion
Power Shovel Dippers. Dredge and Industrial Pumps
Welding Materials for reclamation and hard-surfacing

dencies, but should be filed for them just as faithfully, as this is used by the draft board when reclassification of such classes becomes necessary. When the employer has filed either 42A or B for an employee the draft board is required to notify the employer in the event of consideration of reclassification. This may mean that the employer will desire to file 42A's for some of his employees who are recorded under 42B thus, while not affecting the reclassification from a probable 3-B, will prevent immediate drafting until the deferment value of the job classification has expired.

It should be understood that deferment, in the eyes of the Selective Service, represents the loan *of a man for a time equivalent to the training period required to produce another worker for his job. Thus, every 42A form has a different value in deferment time depending on the job for which the deferment was issued.*

The filing of the 42A form represents evidence of the necessity of deferment for the individual based on occupational need and entitles the employer to appeal from any local board's reclassification before the Board of Appeals in accordance with the regulations of the Selective Service System.

The greatest benefit of the validating procedure on the original Manning Table compiled at the beginning of the plan lies in the fact that the Acceptance Stamp, which accompanies every 42A form, proves conclusively that serious consideration has been given to the necessity for occupational deferment for the stated period of time by the employer, the regional director of WMC and the Selective Service. Such weighty evidence of **bonafide** need is not likely to be a source of much antagonism between employers and the local boards, resulting in appeals.

Since all employers possibly will not operate under the Manning Table Plan, it being voluntary, draft boards have been instructed to continue considering under present regulations the affidavits for occupational deferment submitted by employers who do not furnish job analyses. Local boards were also notified of three new critical job classifications which were to receive superior claim to deferment. They included certain

occupations in the rubber industry, the worker's apparel industry and producers of certain finished wood products.

Latest statement regarding the deferment picture as it relates to the Manning Table Plan was reflected in the statement that the only "draft proof" jobs today were those which required three or more years of training, made by Lieut. Col. H. J. Schwabacher, liaison officer for the Service of Supplies and the War Manpower Commission at the American Management Association meeting in New York last week.

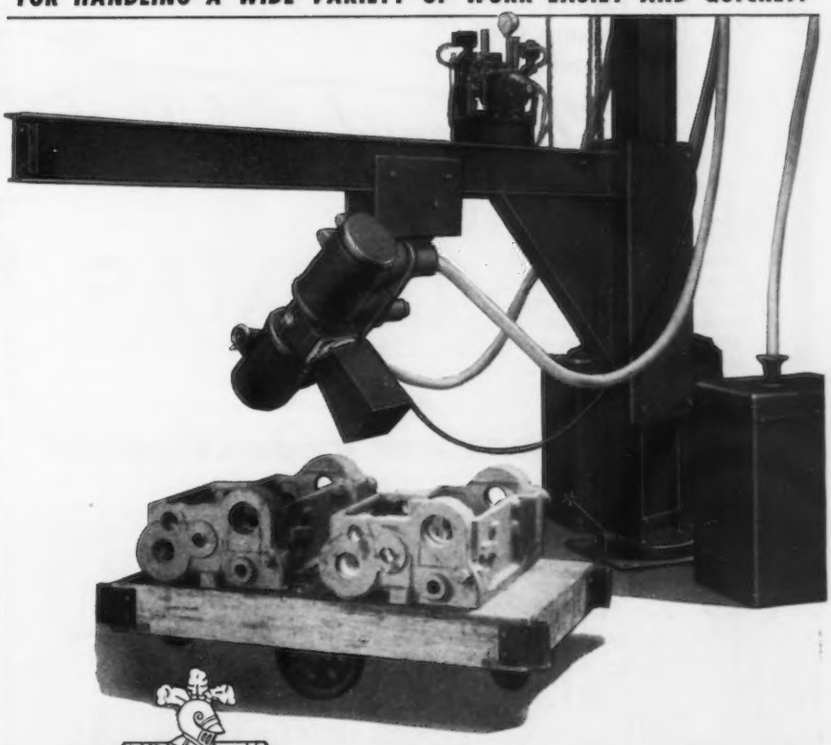
Col. Schwabacher said that men holding jobs which require three to five years of training will not be taken. Any whose training time falls below that limit will be taken when a sufficient time for training of replacements has elapsed. Those whose jobs require less than six months are not to be considered for deferment.

RESURRECTION: Owen D. Young, who retired from business in 1941, is shown lighting his faithful briar behind his desk again, at age 68, as acting chairman of the General Electric Co. Mr. Young jokingly says that he "likes this resurrection so well" that he is less apprehensive about the next one. He will once again collaborate with Gerard Swope who also retired at the same time, now aged 70, who is returning to take the position of president of G.E.

Wide World Photo

THE LATEST X-RAY INSPECTION TOOL for HEAVY INDUSTRY

PENETRATES UP TO 3 INCHES OF STEEL. TRAVELS 6 FEET HORIZONTALLY OR VERTICALLY, AND SWINGS THROUGH A 180° ARC, COVERING A LARGE AREA OF FLOOR SPACE FOR HANDLING A WIDE VARIETY OF WORK EASILY AND QUICKLY.



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If you have an inspection problem in your plant, let a KELEKET X-ray engineer help you solve it efficiently and economically.

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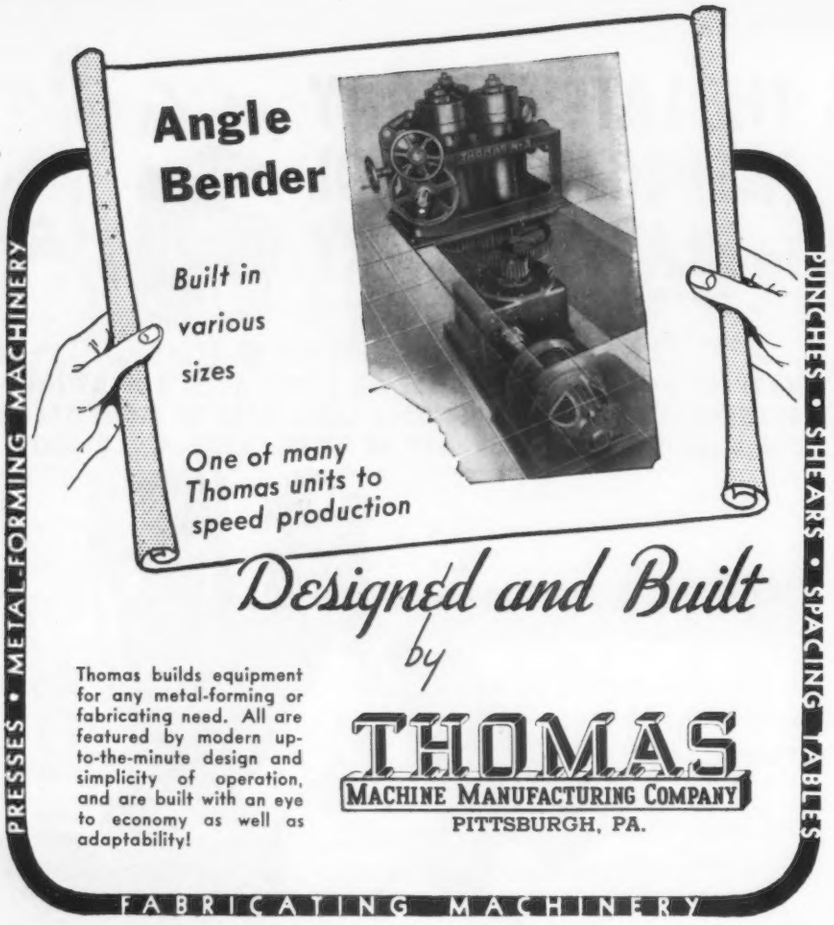
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There is a Ruthman Coolant Pump for almost every purpose. However if any of these pumps do not fulfill your requirements furnish us with a blue print that will show the changes required and we will be glad to make the desired changes. These redesigned pumps will of course contain all the special features of the standard pumps.
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How Controlled Materials Plan Will Be Directed

Washington

• • • **The newest WPB** organization reflects the influence of Ferdinand Eberstadt, vice-chairman on Program Determination, who more than any single individual is responsible for the formulation of the Controlled Materials Plan, which also conforms to business practices. The staff changes, announced Nov. 11, are designed to take care of the flow of work under CMP.

As illustrated by the organization chart which accompanied the WPB press statement, closer knit relationships are made possible between the policy forming bodies such as the Requirements Committee, industry branches and the new controlled materials divisions, including copper, aluminum and steel. These CMP divisions are now to report directly to Ernest Kanzler, director general for operations. The office for Operations has been combined with the Office of Program Determination headed by Mr. Eberstadt.

Industry branches, which represent the WPB regulatory level, have been raised to the status of divisions. These are likewise divided into staff or policy and operating levels. A Requirements subcommittee, composed of representatives from the seven claimant agencies under CMP, is attached to the office of each division director to adjust requirements as they are sent from the claimant agencies. Each division director is to be assisted by a deputy director and advised by industry and labor committees.

The staff of the program vice-chairman will include a Program Bureau, of which Donald D. Davis, president of General Mills is director and a Facilities Bureau, Fred Searls, director. Mr. Searls is a former War Shipping Administration executive. The Program Bureau will act as a staff to the Requirements Committee, bringing together figures on supply of ma-

terials, requirements for critical items and labor needs, and will recommend programs to the vice-chairman. The Facilities Bureau, embodying the former Construction Bureau, will determine the requirements and programs for construction.

On Mr. Kanzler's staff will be a Distribution Bureau to be directed by J. A. Krug, former TVA power manager. The Distribution Bureau will take over the functions of the Bureau of Priorities Control and will administer the distribution of materials through priorities, PRP, and CMP.

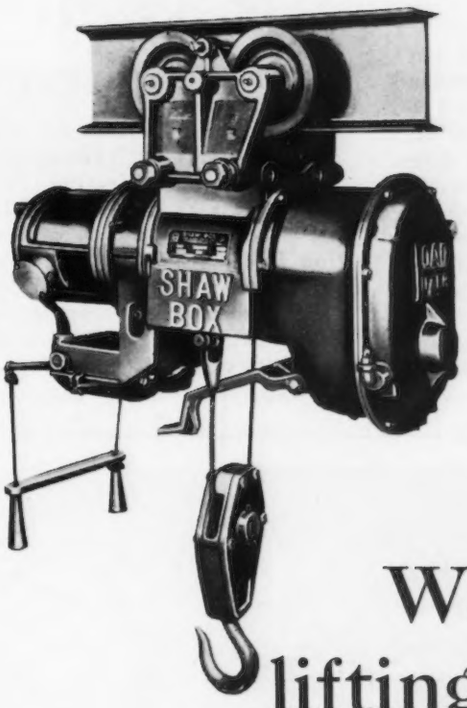
A new set-up to be known as the Resources Agencies, likewise reporting to Mr. Kanzler, has no director as yet. It will handle scrap and salvage programs, simplification and substitution, redistribution of materials and equipment, requisitioning, concentration of industry, stock piling and transportation, resources protection and programs for increasing production and better use of manpower resources. The Resources Agencies will supersede the Bureau of Industrial Conservation headed by Lessing Rosenwald, Sears-Roebuck board chairman.

Under the director general for operations, H. W. Dodge, Texas Co. sales manager, is deputy director general. John R. Kimberly, Kimberly Clark Corp., president, is deputy director general for Industry and Wade Childress, Columbia Terminals Co. president, is deputy director general for Field Operations. T. Spencer Shore, General Tire & Rubber Co. executive, is director of Industry Advisory Committees.

The other industry divisions have been grouped under five operating bureaus as follows:

MINERALS BUREAU, Joseph M. Scribner, director—Mining; Mica-Graphite; Tin-Lead; Zinc; Miscellaneous Minerals. Mr. Scribner was former assistant deputy director general for Industry Operations.

COMMODITIES BUREAU, Ernest Reid, director — Chemicals; Printing and Publishing; Pulp and Paper; Cork and Asbestos; Containers. Mr. Reid's previous connection was with the Mellon Institute and he once served as



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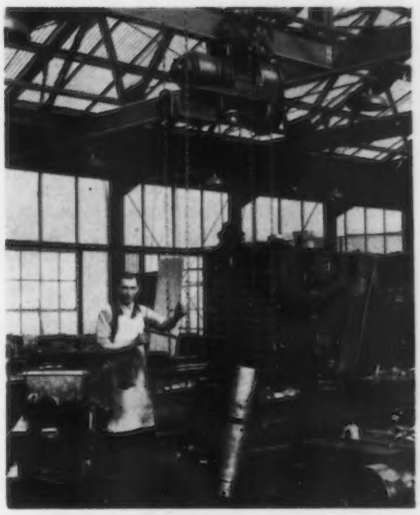
IF you have clock-round lifting with frequent capacity or close-to-capacity loads, then a 'Load Lifter' Hoist is the sure installation for you. They are built in sizes from 500 lbs. to 40,000 lbs. and all are strong and rugged yet fine mechanisms capable of giving the maximum of trouble-free service.

And why not? Built into them are special features of which these are dominant:

1. "One-point" lubrication.
2. Hyatt Roller Bearings and Ball Bearing Motor.
3. Safety upper stop; lower blocks, sure brakes.
4. Two-gear reduction drive; sealed against oil leaks; steel interchangeable suspension.



'Load Lifter' electric hoists are built with lifting capacities of 500 lbs. to 40,000 lbs. in all combinations required for industrial lifting necessities. They are adaptable to almost every working condition within their capacities. Send for Bulletin 350.

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chief of the WPB Chemicals Branch.

CONSUMERS' GOODS BUREAU, Lewis S. Greenleaf, director—Food; Beverages and Tobacco; Consumers Durable Goods; Textile, Clothing and Leather; Service Equipment; Distributors (formerly Distributors Branch of the Bureau of Priorities Control). Mr. Greenleaf is sales manager for Behr Manning Corp., Troy, N. Y.

CONSTRUCTION AND UTILITIES BUREAU, John Hall, director, American Radiator and Standard Sanitary Corp., vice-president —Plumbing and Heating; Building Materials; Lumber and Lumber Products; Power; Transportation Equipment; Communications Equipment; Governmental (formerly Bureau of Governmental Requirements).

EQUIPMENT BUREAU, Harry A. Rapelye, director, sales manager, Continental Can Co.—General Industrial Equipment; Automotive; Tools; Farm Machinery; Construction Machinery; Safety and Technical Supplies (formerly Health, Safety and Technical Equipment Branch).

Typical industry divisions will have counterparts of the Program, Distribution and Resources Sections, to advise the division director on policies with regard to these subjects. On Programs, the Commodity or Industry Sections within the divisions will compile estimates of supply and demand for the output of the industry, and propose the most advantageous reconciliation thereof. Within the scope of the program function will be the estimation of maintenance and repair requirements and of materials for programmed production.

Division distribution functions will include the duties of assuring production and distribution of the output of the industry in accordance with program determinations made by the claimant agencies and justified by the Requirements Committee and its staff together with directives received through the Distribution Bureau. Specific functions will include processing preference rating and PRP applications, direction of materials and products distribution, allocation of materials and equipment available for redistribution, withdrawal from stockpiles, allocation of scrap, material bookkeeping, consideration of compliance cases and appeals.

Division resources functions include expansion of supply by curtailing less essential consumption and assuring optimum utilization of the resources of the industry as necessary to meet essential war demands; recovery of scrap; development of new sources of supply; construction of new productive facilities; importation and stockpiling; recovery curtailment of less essential production and use of materials; substitution of less critical materials; simplification and standardization of materials and products; improvement of production methods and use of productive capacity; concentration and/or conversion of industry; best use of manpower resources; redistribution of materials and equipment; conservation of transportation and of materials in packaging.

WHEN dust and grime are prevalent look out for waste. Don't be lulled into thinking that they are necessary evils. The fact is that they exact a heavy toll, and for that reason should be controlled.

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AMERICAN HIGH EFFICIENCY DUST COLLECTORS

Instructions for Preparing Bills of Materials Summarized

• • • **Under the** newly announced Controlled Materials Plan, claimant agencies during November and December are scheduled to be collecting bills of material and estimates of their requirements. The claimants will submit their requirements in January, and allotments will be made in February.

Any prime consumer using controlled materials to make Class A end products (which are mostly direct military items) will obtain his allotments from the Claimant Agency or the office of the agency to which such Class A products are sold. Any consumer using controlled materials in the production of Class A products which are supplied as component parts or sub-assemblies to any other consumer making Class A or Class B products will obtain his allotments as a secondary consumer from such other consumer.

At the request of the appropriate Claimant Agency, prime consumers shall prepare and submit to such agency Summary Bills of Materials and, if specially requested, Detail Bills of Materials, for procurement items as specified. The responsibility for compiling a complete Bill of Materials for a procurement item including all sub-contracted parts, is vested in the prime consumer.

In the case of purchased parts or assemblies it will be necessary for the consumer to secure from his secondary consumer the necessary information to complete the Bill of Materials and to furnish him with a copy of these instructions, in order to preserve uniformity in the preparation of all Bills of Materials.

Definitions

Controlled Material—Carbon steel, alloy steel, copper, aluminum and such other materials as may be prescribed from time to time, in each case only in the forms and shapes indicated in the CMP Materials List or as otherwise ordered by the vice-chairman on Program Determination.

CMP Materials—The materials on the list attached hereto. The list includes controlled materials and other materials for inclusion in bills of materials and inventory reports.

Bill of Materials—With respect to any item, a statement of the amounts of materials required for physical incorporation in the production of a given product, including the portion of such materials consumed or converted into scrap in the course of processing.

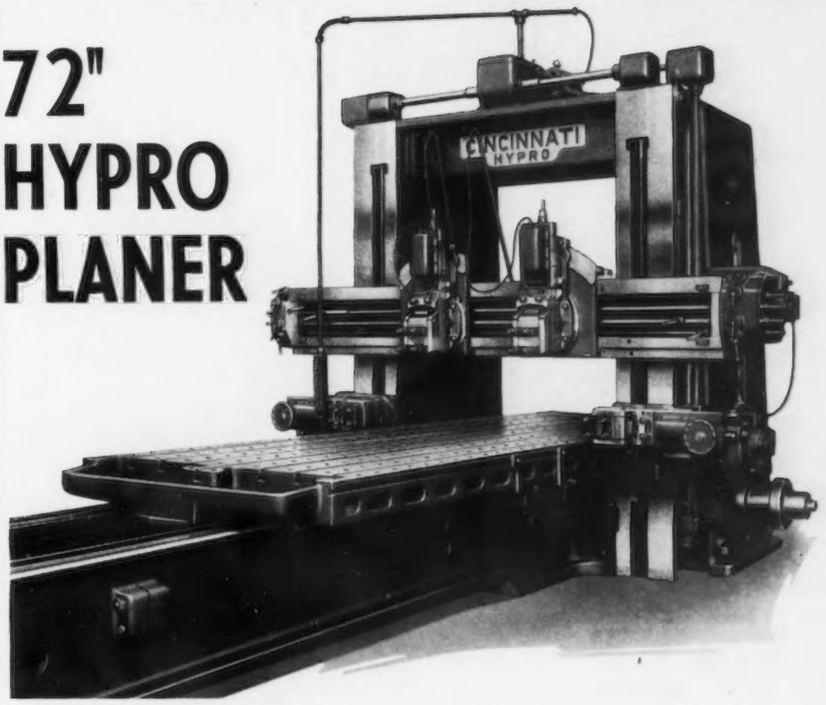
Prime Consumer—Any person who receives an allotment of controlled material from a Claimant Agency either directly or through an office of such agency.

Secondary Consumer—Any person who receives an allotment of controlled material from a prime consumer or another secondary consumer.

Class A Product—Any product

Cincinnati

72" HYPRO PLANER



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containing any controlled material fabricated beyond the forms and shapes specified in the CMP Materials List, except a Class B Product. Direct military items.

Class B Product—Any product containing any controlled material fabricated beyond the forms and shapes specified in the CMP Materials List, which is contained in the Class B List.

1. *Detail Bill of Materials*—A list of all component parts of a procurement item showing material requirements.

2. *Summary Bill of Materials.*—A list of the material requirements for a complete procurement item, or a recapitulation of the Detail Bill of Materials. In some instances the Claimant Agency involved may request that this Summary Bill be subdivided into functional groups, for scheduling purposes. In each case spare parts sets must be shown separately and sub-totalled on the Bill of Materials.

3. *Prototype Bill of Materials.*—A Bill of Materials that is applicable to several styles or models of the same basic part or assembly, varying slightly in minor details which have little or no effect on the aggregate material content.

4. *Procurement Item*—The complete assembly or product to be furnished by a prime consumer including extra parts, such as spare wheels and tires on trucks, and auxiliary or accessory equipment, such as picks, shovels, fire extinguishers, tool kits, etc., on tanks, which are normally attached to or shipped as a constituent part of the procurement item; and spare parts sets specified to be shipped concurrently with the basic procurement item.

5. *CMP Materials List*—This is a classification list of materials, prepared for the purpose of the preparation of Bills of Materials. These materials have been assigned code numbers for convenience in accumulating the data requested. A conversion table showing the translation from "Red Book" codes to CMP codes is included.

6. *CMP Materials Code Number*—The number taken from the CMP Materials List, used for convenience in accumulating the data requested.

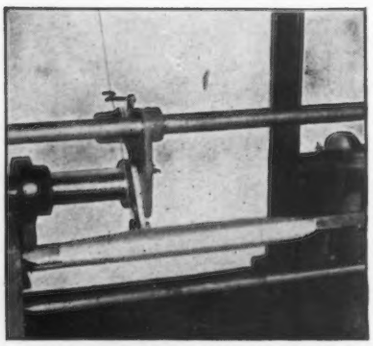
7. *Drawing or Part Number*—The number normally used to identify the individual part or assembly, and for use in connection with the preparation of Detail Bills of Materials. If the official government part numbers are available, these should be used.

8. *Part Name*—The name of an individual part or an individual assembly, such as rope, buckle, piston, firing pin, ignition coil, etc.

9. *Specification or Chemical Analysis of Material*—This refers to standard specifications such as "S. A. E.", "Army", "Navy", "Federal", "A. S. T. M.". In the absence of such recognized specifications, a manufacturer's specifications may be used, but only if an analysis showing chemical composition is furnished.

10. *Net Weight*—The weight of a material actually contained in a finished part (in the case of a Detail Bill of Materials) or in a completed procurement item (in the case of a Summary Bill of Materials).

11. *Gross Weight (including re-*



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Accurate Taper Winding of Wire for Weaving of Wire Cloth for FILTERS · SCREENS · SIFTERS, etc.

The FIDELITY Quill Winder for accurate, high-speed taper winding of wire—six packages of uniformly even lay and taper at one time—speeds production for manufacturers of wire cloth for filters, screens, sifters, etc.

The taper is automatically governed by control buttons which reverse and successively shorten the traverse in the same operation.

Slow acceleration prevents wire stretching and breakage. Other outstanding advantages include: hydraulic control, individual motor drive, tension control on feeder, and automatic stop motion and yardage meter.

You can wind wire from spools or brake-controlled reels depending on your requirements.

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2. Six quills wound simultaneously
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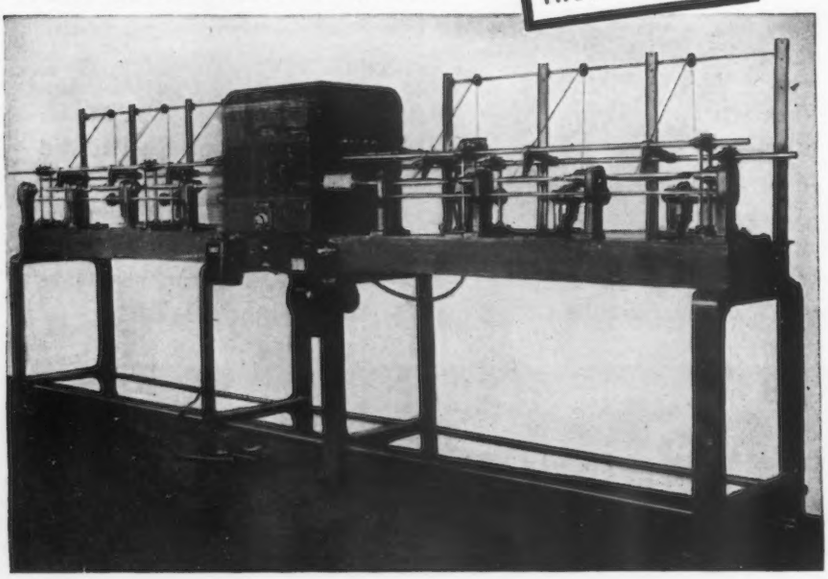
4. Dial control for traverse changes
5. Automatic stop motion
6. Automatic angular winding attachment
7. Automatic yardage meter
8. Winds from either spools or reels
9. Push-button control
10. ¾ HP motor
11. 2' x 13½' floor space



jections, etc.)—The weight of the material in the form shipped by the material producer and required for the manufacture of the procurement item or one of its parts. This should include allowances for processing losses, rejections, culls, testing, and spoilage, in such manner as may be prescribed by the vice-chairman. For special definitions consult the CMP materials list.

12. *Number of Parts (shown on Detail Bill of Materials only)*—Number of finished parts (of the particular part being reported) to be incorporated in the functional group or its sub-division of the procurement item being reported. Taking, for example, a piston ring as the part being reported for a six cylinder motor having two rings for each piston,—the *Number of Parts* would be 12 if the motor were the functional group under consideration.

13. *Total Net Weight*—a. Detail *Bill of Materials*—On the Detail Bill of Materials, Total Net Weight is the Net Weight Per Part multiplied by the Number of Parts. It is the aggregate Net Weight of all parts identical with the one being reported which will be incorporated in the particular sub-division of the procurement item as listed. In the case of the piston rings mentioned above, it is the total net weight of the 12 piston rings.

b. *Summary Bill of Materials*—On the Summary Bill of Materials the total Net Weight is the total net weight of a particular material contained in the complete procurement item, unless the Summary Bill is subdivided by functional or other groups, at the specific request of the Claimant Agency involved; then it will be the total weight contained in the sub-division of the procurement item as listed.

14. *Total Gross Weight (including rejections, etc.)*—a. *Detail Bill of Materials*— On the Detail Bill of Materials, Total Gross Weight is the Gross Weight Per Part multiplied by the Number of Parts. In the case of the piston rings referred to above, it would be the total weight of the particular material needed to produce the 12 rings including allowances as indicated in the definition of "Gross Weight."

b. *Summary Bill of Materials*—On the Summary Bill of Materials, the total gross weight (as defined) is the total of a particular material required to make all parts of the procurement item. However, if the Summary Bill of Materials is subdivided by functional or other groups, at the specific request of the Claimant Agency involved, it will be the total weight of the material needed to make all the parts in such a sub-division.

15. *Lead Time*—(Manufacturing or flow time)—Lead time is the time interval expressed in months between the required delivery of materials from the plant of the supplier of the listed materials and final acceptance or delivery of the procurement item, or in the case of Class B products as defined, upon completion of their manufacture.

For example, the lead time for bar stock from which a steel forging is made would be the total elapsed time from the delivery of the bar stock from the steel mill to the time of acceptance by the agencies of the item of procurement in which the finished forging is incorporated. This time will include

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Continuous normalizing, annealing and heat-treating furnace.
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all intermediate transportation and processing time such as time for forging, heat treating, machining, assembly into the final product and testing.

Note—It is recommended that in those cases where questions arise as to the foregoing definitions or with respect to the procedure outlined below, the prime consumer immediately refer the matter for decision to the appropriate Claimant Agency requesting the information in order that no delay or unnecessary effort be involved in this work.

General Instructions

1. All Bills of Materials should indicate the gross and net weight (unless specifically exempted by the Claimant Agency) of each of the materials listed in the attached CMP Materials List, which are required for and contained in the complete procurement item. The exceptions to this rule will be (1) Government Furnished Equipment produced by other Prime Consumers, (2) Class B products as defined. In the case of both of these exceptions the Bill of Materials is to list by name and part number (if available) the quantity or dollar value of each of these items required in the complete procurement item, and is to show the time interval between receipt of class B items as such and final acceptance or delivery of the procurement item.

2. The presentation of Summary Bills of Materials should not be delayed awaiting the accumulation of net weight information. The submission of such net weight data may be deferred until a later date.

3. All materials are to be reported in terms of the unit of measure indicated on the attached CMP Materials List. Particular care should be taken to indicate clearly the decimal position in reporting these weights.

4. The Prime Consumer must maintain Bills of Materials on all procurement items on a current basis at all times by submitting revisions indicating the effect of all engineering or specification changes which substantially alter the total quantity of any material required during the month.

5. The Bill of Materials is to include all material on the CMP Materials List incorporated in the finished product (except in parts on the excluded lists), including, for example, material deposited in plating and packaging when specified as an integral part of an item of procurement. Materials indirectly used in the manufacturing process should be omitted, such as grinding wheels, factory maintenance operating and testing supplies

6. In reporting small purchased assemblies, which in the aggregate consume small quantities of the listed materials, it will be satisfactory to accept from the secondary consumer supplying such assemblies, a prototype Bill of Materials noting the basis of the Bill of Materials.

7. At the specific request of the Agency involved, the specifications or chemical analysis and size range of materials shall be shown on the Detail Bill of Materials.

8. At the request of the Claimant Agency the prime consumer will indicate for the materials listed in his summary Bill of Materials, approximate lead times as defined. If the manufacturing period is relatively short, a single lead time may be sufficient. Where the manufacturing time is relatively long and where the delivery

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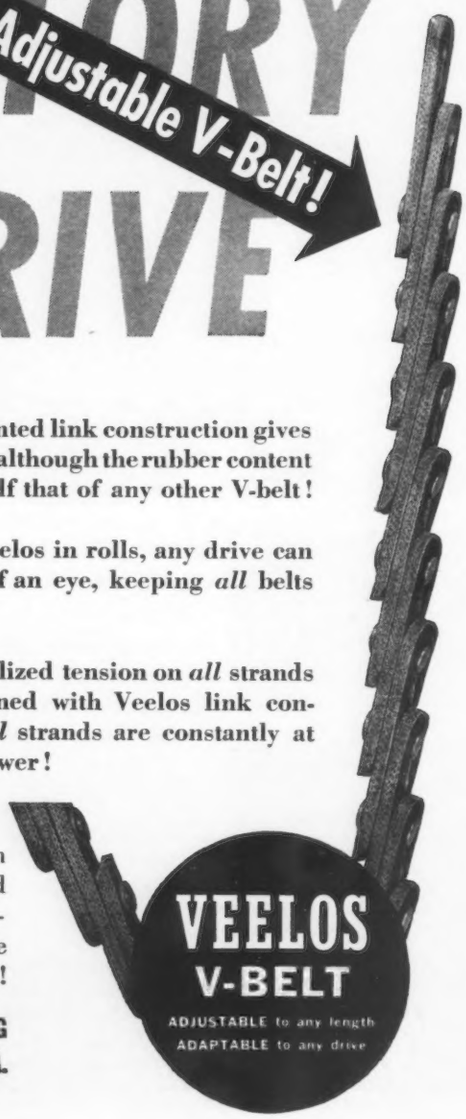

1 **SAVES RUBBER!** Patented link construction gives Veelos greater flexibility although the rubber content of Veelos is less than half that of any other V-belt!

2 **SAVES TIME!** With Veelos in rolls, any drive can be replaced in the bat of an eye, keeping *all* belts on the drive!

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Let a Veelos "Production Warden"—especially trained in power transmission work—study *your* set-up for possible savings of rubber, time, power!

MANHEIM MANUFACTURING & BELTING CO., MANHEIM, PA.

VEELOS V-BELT
ADJUSTABLE to any length
ADAPTABLE to any drive

of a material is required at varying time intervals, this should be indicated. In such cases, the quantity required at each time interval should be listed separately on the Summary Bill of Materials and the lead time listed in the appropriate column.

9. In order to eliminate, so far as practicable, all unnecessary work, those consumers who have already furnished Bills of Materials of one type or another should consult the Claimant Agency involved to ascertain whether such data are in sufficient detail to meet the requirements of these instructions. In all cases where a prime consumer wishes to submit his Bills of Materials on a form other than that included with these instructions, permission must be obtained from the Agency requesting the Bill of Materials to use such a form.

10. In order to obtain complete and accurate information it is desirable to have a definite group assigned to prepare Bills of Materials information. This group should contain individuals familiar with engineering specifications and with production materials and methods. However, the exact method used by a prime consumer to produce Bills of Materials is his own responsibility, providing the information compiled is as requested.

11. While it is imperative that a Summary Bill of Materials be submitted by the Consumer, in certain instances Detail Bills of Materials will also be required by the Claimant Agency involved. Regardless of whether or not the Detail Bill of Materials is requested, the Consumer will find the Detail Bill of Materials form useful as a work sheet in accumulating the data to be furnished in the Summary Bill of Materials.

12. The presentation of a Summary Bill of Materials to the Claimant Agency involved should not be delayed awaiting the preparation of the Detail Bill of Materials in its final form. The submission of the Detail Bill of Material may be deferred until a later date if such delay is anticipated.

Detail Bill of Material

a. The Detail Bill of Materials (see attached form) should be prepared from the engineering parts list and should show an analysis by CMP materials of each component part (excluding GFE and

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KENNAMETAL lasts longer—even under the most severe demands of boring, turning, and facing steels because of its outstanding qualities of hardness, elasticity and wear resistance.

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Class B items) of the procurement item under the following headings:

(1) Drawing or part number.
(2) Part name.
(3) Specification or chemical analysis of the material (only to be furnished when specifically requested).
(4) C. M. P. Material Code number.
(5) Net weight of finished part.
(6) Gross weight (including rejections, etc.) of material required to make the part.
(7) Number of parts.
(8) Total net weight.
(9) Total gross weight (including rejections, etc.).

b. At the direction of a Claimant Agency, separate Bills of Materials should be prepared for each procurement item (as defined) and for spare parts called for as a *separate procurement item.*

c. Parts in the Detail Bill of Materials should be arranged in functional groups. In general these groupings should be determined by the Prime Consumer in accordance with his own company or industry practice and should be modified only to the degree necessary for adequate scheduling by the Claimant Agencies. This will usually require a segregation from the basic unit of procurement of extra parts, spare part sets and accessory equipment shipped concurrently with the procurement item.

d. The Detail Bill of Materials is to include direct material for all purchased items except Class B products as well as those parts manufactured by the Prime Consumer.

e. When reporting small purchased assemblies excluding Class B products, which are not generally separated into individual parts by the purchaser, the analysis, may, subject to the approval of the Claimant Agency involved, be made for the entire assembly without detail as to each individual part, except for individual pieces or subassemblies which may be furnished in spare part sets. Components of purchased assemblies should be listed in a group immediately following the name and part number of the assembly in order that they may be identified readily as parts of such assembly.

f. It may be necessary in some cases to make a quick engineering estimate of approximate material requirements by grouping without detail small items which require negligible amount of material. In each instance where this procedure is used, a notation on the Bill of Materials should indicate the manner in which such material estimates were calculated.

Summary Bill of Materials

a. The Summary Bill of Materials shall show total amounts of each material shown on the CMP Materials List required for a procurement item as follows:

(1) Controlled Material List name.
(2) Controlled Materials List Code number.
(3) Total net weight.
(4) Total gross weight, including rejections, etc.
(5) Lead Time or Lead Times.

b. Any further analysis by functional or other grouping need be made only at the specific request of the Claimant Agency requesting the Bill of Materials, and should be considered as a limited and non-recurring special study.

c. The Summary Bill of Materials shall contain a separate list of Class B items incorporated in the procurement item being reported, showing the name, part

number and time interval as explained in the instructions.

CMP MATERIALS LIST

Units: pounds except for wood

Controlled Materials
- Aluminum
- Copper and Copper Base Alloys
- Steel

Other Materials
- Beryllium
- Cadmium
- Cobalt—other than as an alloying element
- Cordage Fibers
  - a. Manila
  - b. Sisal
  - c. Jute
  - d. Istle
- Magnesium
- Mercury
- Mica—other than ground mica
- Monel—natural
- Nickel—other than as an alloying element
- Nylon
- Rayon—high tenacity
- Rubber
  - a. Crude
  - b. Liquid Latex
  - c. Reclaimed
  - d. Synthetic
- Tin
- Tungsten—other than as an alloying element
- Wood
- Zinc

ALUMINUM PRODUCT CLASSIFICATION

CMP Materials Code Number	Material	Code in Official Classification List of Raw and Basic Industrial Materials
	Bar and rod (excluding requirements for stock for wire forgings, rolled structural shapes, and electrical cable)	201-02
	By sizes:	
201-02-01	⅜"-¾" inclusive } Maximum diameter (for rounds & ovals)	
201-02-03	Over ¾"-1⅝" inclusive } Maximum distance between faces (for squares, hexagonals, octagonals, rectangles)	
201-02-05	Over 1⅝"-3" inclusive }	
201-02-07	Over 3" }	
201-05-00	Wire.—Wire covers maximum diameters under ⅜" in rounds, ovals, squares, hexes, octagonals, and rectangles	201-05
201-06-00	Cable (electrical transmission only)	201-06
201-09-00	Forgings and pressings (before machining)	201-09
	Castings (before machining)	201-11 201-12
201-11-01	From high grade ingot*	201-13
201-11-02	From other than high grade ingot*	201-14 201-15
201-22-00	Rolled structural shapes (angles, channels, zees, tees, etc.)	201-22
	Extruded shapes:	
201-27-00	2S, 3S, 53S, and 61S alloys	201-27
201-28-00	All alloys except 2S, 3S, 53S and 61S	201-28
	Sheet, strip and plate—excluding stock for foil, impact extrusions, and forgings	
201-37-00	2S and 3S alloys	201-37
201-38-00	Alloys other than 2S and 3S	201-38
	Tubing:	
201-46-00	2S and 3S alloys	201-46
201-47-00	Alloys other than 2S and 3S	201-47
201-51-00	Powder	201-51 201-52 201-53 201-54 201-55
201-71-00	Foil (.005" and thinner)	201-71
201-73-00	Impact extrusions	201-73
	Ingot—excluding ingot for aluminum castings, sheet, plate, strip, rod, bar, extrusions, and powder	201-19
201-19-00	High grade*	
201-19-02	Low grade*	

*Low grade ingot means any aluminum which contains copper in excess of 4% by weight, and either iron or zinc in excess of 1% by weight.

MAGNESIUM PRODUCT CLASSIFICATION

CMP Materials Code Number	Material	Code in Official Classification List of Raw and Basic Industrial Materials
217-01	Extrusions: excluding extruded stick and forging	217-02 217-23
217-09	Forging, before machining	217-09
217-11	Sand Castings, heat treated, before machining	217-11
217-12	Sand Castings, not heat treated, before machining	217-12
217-13	Permanent and semi-permanent mold castings, heat treated, before machining	217-13
217-14	Permanent and semi-permanent mold castings, not heat treated, before machining	217-14
217-15	Die Castings, before machining	217-15
217-19	Ingot and extruded stick, excluding requirements for ingot for magnesium; castings; extrusions; sheet, strips, and plate; and powder	217-19 217-75
217-30	Sheet, strip, plate	217-30
217-81	Powder	217-81 217-82 217-83 217-84 217-85 217-86 217-87

For FASTER SCRUBBING..

Spiral Wound BRUSHES

by Pittsburgh Plate Glass Company

By all means, investigate! Find out what our engineering representatives can do to help you speed up the production of light gauge steel and tinplate.

"Pittsburgh" Spiral Wound Brushes *can be built to your order* in various fills—horsehair, nickel silver wire and tampico. *Write or phone for further information.*

PITTSBURGH
PLATE GLASS COMPANY
Brush Division • Baltimore, Md.

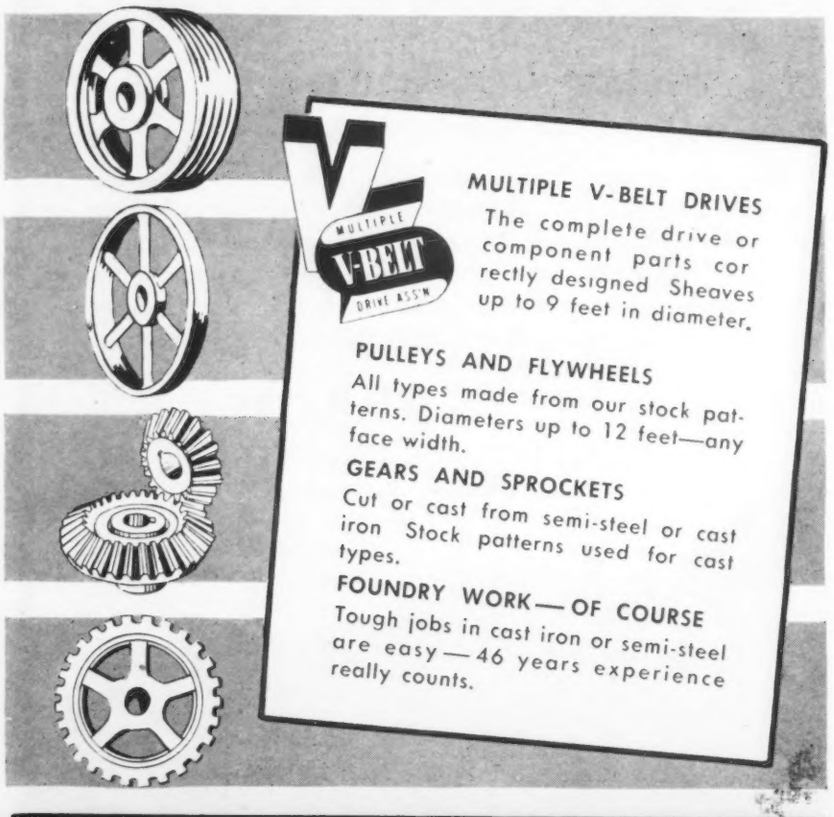
Spiral Wound Brush of gray mixed tampico designed especially for cleaning sheets in tin mills.

COPPER PRODUCT CLASSIFICATION

CMP Materials Code Number	Material	Code in Official Classification List of Raw and Basic Industrial Materials
	Brass Mill Products	
	Copper Base Alloys	
207-80	Ammunition Cups, disks and slugs	no number
206-32	Sheet and strip (other than cups and disks)	206-32 207-32
206-04	Rods, bars, and wire (including extruded shapes, not including slugs)	206-04 206-08 206-23 207-04 207-08 207-23
206-41	Tubing or pipe	206-41 206-42 206-43 207-41 207-42 207-43
	Copper	
212-32	Plate, sheets and strip	212-32
212-19	Rods and bars, including extruded shapes (not including wire bars and ingot bars)	212-19
212-41	Tube and pipe	212-41 212-42 212-43
	Wire Mill Products	
	Copper	
212-08	Wire and cable (including copper content of insulated wire and cable)	212-08
	Foundry Products	
	Copper and Copper Base Alloys	
206-01	Castings	206-10 207-10 212-10

PYOTT

A NAME TO CHECK FOR POWER TRANSMISSION



MULTIPLE V-BELT DRIVES

The complete drive or component parts correctly designed Sheaves up to 9 feet in diameter.

PULLEYS AND FLYWHEELS

All types made from our stock patterns. Diameters up to 12 feet—any face width.

GEARS AND SPROCKETS

Cut or cast from semi-steel or cast iron Stock patterns used for cast types.

FOUNDRY WORK—OF COURSE

Tough jobs in cast iron or semi-steel are easy—46 years experience really counts.

PYOTT FOUNDRY AND MACHINE CO.
328 NORTH SANGAMON STREET • CHICAGO

ZINC PRODUCT CLASSIFICATION

CMP Materials Code Number	Material	Code in Official Classification List of Raw and Basic Industrial Materials
	Zinc other than as an alloying element	234-92 234-93 234-94
	By grades:	
234-92-01	Special high grade, high grade and intermediate—zinc content of 99.5% or higher	no number
234-92-02	Brass special, selected, and prime Western	no number

STEEL PRODUCT CLASSIFICATION

CMP Materials Code Number	Material	Code in Official Classification List of Raw and Basic Industrial Materials
	Carbon Steel (Grades 00, 10, 11 and 13)	
103-11	Bars, cold finished	103-85 103-86 103-87
103-21	Bars, hot rolled	103-81 103-82 103-83 103-84 125-81
119-01	Ingot, billets, blooms, slabs, tube rounds, skelp and sheet and tin bar	119-00 161-00 139-00
145-11	Pipe	145-86 145-87 145-88
135-01	Plates	135-81 135-82 135-83 135-84 135-85 135-86 135-87
162-01	Rails and track accessories	162-81 162-89 164-00
131-01	Sheets and strip	131-80 131-81 131-82 131-83 131-84 131-85 131-86 131-87 131-88 131-89 131-90
110-01	Steel Castings	110-81 110-82 110-83 110-89
125-01	Structural shapes and piling	125-82 125-83 163-81 163-82
165-01	Tin plate, terne plate, and tin mill black plate	165-00
145-21	Tubing	145-80 145-81 145-82 145-83 145-84 145-85
167-01	Wheels and axles	167-00
105-01	Wire rods, wire, and wire products	105-81 105-82 105-83 105-84 105-85 105-86 105-89
	ALLOY STEEL—Including Stainless (All other grade codes)	
103-12	Bars, cold finished	103-85 103-86 103-87
103-22	Bars, hot rolled	103-82 103-83 103-84
119-02	Ingots, billets, blooms, slabs, tube rounds, sheet bar	119-00 139-00 161-00
145-12	Pipe	145-86 145-87 145-88
135-02	Plates	135-81 135-82 135-83 135-84 135-85 135-86 135-87

STEEL PRODUCT CLASSIFICATION

CMP Materials Code Number	Material	Code in Official Classification List of Raw and Basic Industrial Materials
131-02	Sheets and strip	131-80
		131-81
		131-82
		131-83
		131-84
		131-85
		131-86
		131-87
		131-88
		131-89
110-02	Steel castings	110-81
		110-82
		110-83
		110-89
145-22	Tubing	145-80
		145-81
		145-82
		145-83
		145-84
		145-85
167-02	Wheels and axles	167-00
105-02	Wire rods, wire, and wire products	105-81
		105-86

CLASS B PRODUCT LIST

(This list is given only as a general indication of the type of items to be classified as Class B products. A definitive classification will be issued promptly.)

Agricultural machinery and equipment
Air conditioning equipment
Batteries
Bearings; ball and roller
Bolts, nuts, rivets, screws and washers
Blowers and fans; blast, blower type, exhaust drying, forced draft, and industrial including dust collecting apparatus
Communication equipment
Compressors and vacuum pumps; reciprocating, centrifugal, turbo-blowers and rotary
Condensers, steam, including surface, jet and barometric
Construction machinery and equipment
Consumers' durable goods
Containers
Electrical apparatus for internal combustion engines
Fasteners, textile and leather
Furniture
General industrial machinery other than components of Class A products, including elevators, conveying equipment, industrial trucks, etc.
Generators, electric
Hardware
Health equipment and supplies
Heat exchangers
Instruments for indicating, regulating, and recording temperature, pressure flow, liquid level, humidity, movement, time and electrical quantities
Machine tools and metal working machinery
Mining machinery and equipment
Motors, electric, and motor generator sets
Office and service machinery
Petroleum machinery
Piston rings
Plumbing fittings and supplies and plumbers' specialties such as fixture fittings and trim
Plumbing, heating and cooking equipment
Power boilers and auxiliary equipment
Power equipment and public utility equipment including electric, gas, water, central heating and other public utility apparatus and equipment
Pumps, power driven except measuring and dispensing pumps
Refrigeration, commercial and industrial
Safety and technical equipment
Spark plugs
Special industrial machinery, including food machinery, rubber working machinery, wood-working machinery, etc.
Switchgear, panelboards, switchboards, motor controls, switches, circuit breakers, and other electrical control equipment and accessories
Transformers
Transportation equipment (including automotive)
Turbines, land and marine
Valves
Welding rods and electrodes
Wiring devices and supplies including electric fuses and pole line hardware and insulators

This list is intended to include certain specified types of intermediate products or component parts which may be included in either Class A or other Class B products and, in addition, all civilian-type end products. For a specific list of civilian-type end products, reference should be made to the instructions to be furnished regarding types of bills of materials which manufacturers of each type and product within both Classes A and B are to be requested to provide.

Industrial Diamonds

Washington

• • • **WPB last Thursday** amended Order M-109, industrial diamonds. Effective immediately, no rough diamonds not incorporated in tools and other devices may be sold, delivered, or accepted unless: (1) to fill an order bearing a rating of A-1-j or higher; (2) the aggregate weight was 50 carats or less of crushing bortz or five carats or less of rough diamonds to a single customer in a single month; or (3) the WPB has specifically authorized the transfer.

The A-1-j rating is sufficiently high to insure that industrial diamonds will be used for legitimate manufacturing purposes. There is no particular shortage of diamonds, though control is necessary to prevent leakage into unfriendly

STANLEY
"FLUD-LITE" MAGNIFIERS

★ Floodlights the work area with glare-free fluorescent light.

★ Magnification prevents eye-strain and lessens worker fatigue.

★ Saves man-hours, speeds production.

★ Reveals the finest details.

SPEED UP INSPECTION . . . ASSEMBLIES

With Stanley "Flud-Lite" Magnifiers, a flood of "natural" light on the work, plus the high quality 5" diameter lens, increases the "eye-efficiency" of inspectors, assemblers, machinists and toolmakers. The tiniest cracks, scratches, and other flaws in machined parts are quickly revealed. Reamers, gauges, punches, dies, etc., can be checked at a glance.

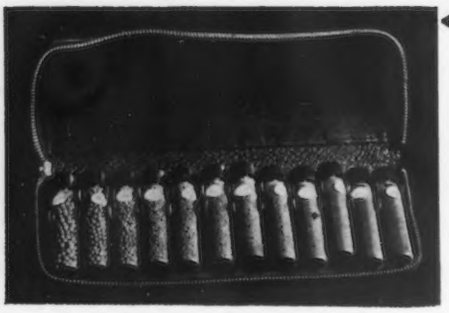
No. 701 is the bench type "Flud-Lite" Magnifier. Swivel joints permit adjustment to any desired position. Base it removable to allow permanent attachment in any location.

No. 701H is the portable type "Flud-Lite" Magnifier. It permits inspection anywhere in the plant, inside machines, and other hard-to-reach places. Fitted with a comfortable grip, hardwood handle and six feet of approved cable.

TRADE STANLEY MARK

Ask your Stanley Distributor about "Flud-Lite" Magnifiers. Literature sent on request. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

STANLEY
Electric Tools



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

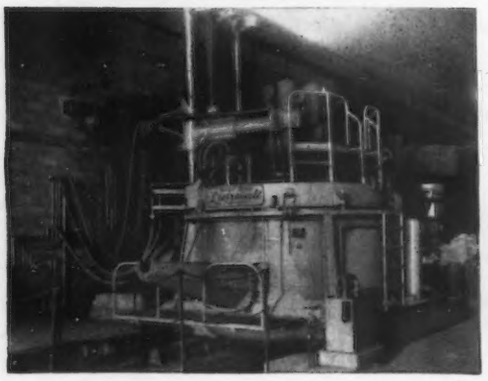
•

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

the furnace of today and tomorrow



TOP CHARGE TYPE

MOORE RAPID *Lectromelt* FURNACES

★ Flexibility, rapidity and economy of operation are distinguishing features of LECTROMELT furnaces. They are ruggedly built to give long and efficient service with minimum maintenance. Top charge type LECTROMELTS increase steel production with less consumption of power, and with savings in refractory and electrode costs. Both door charge and top charge LECTROMELTS are available in sizes ranging from 100 tons down to 25 pounds capacity. Write for complete details.

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH, PENNSYLVANIA

hands, speculative buying and other unnecessary traffic.

Permission to deliver and accept delivery must be applied for by both the seller and buyer on Form PD-377. These applications should be filed with the WPB New York regional office. Wherever action is not taken on such applications within 10 days it shall be considered to have been disapproved. In the case of stocks of other diamonds on hand, quarterly reports on Form PD-376 must be filed with WPB.

•

L-172 Amended

Washington

• • • **Because control** over surface condensers has been established by Amendment No. 4 to L-117, announced Nov. 3, by the WPB, such apparatus have been removed from Order L-172, which formerly controlled their distribution.

•

WPB Approval Necessary

Washington

• • • **Preference ratings** assigned to military and other government orders for repair, mantenance and operating supplies now must be approved by WPB, according to the terms of Amendment No. 2 to Priorities Directive No. 2. Priorities Directive No. 2, issued Sept. 10, lists a number of circumstances in which ratings may be assigned by the Army, Navy and certain other government agencies without WPB approval, and heretofore has not required such approval in the case of repair, maintenance and operating supplies.

•

Galvanized Ware Curbed

Washington

• • • **Approximately 270** manufacturers, according to WPB, are affected by an order, L-30-a, which puts under simplification and curtailment restrictions, effective Nov. 12, galvanized ware, and all steel products which have plain, japanned, painted, lithographed or lacquered finishes. It is estimated that the order will make 44,000 tons of steel and over 10,000 tons of zinc available for the war production program. Also, it was said, the order will mean a reduction by Jan. 1 from 150 of all sizes and kinds of galvanized

ware now made to six articles of only a few sizes.

The order cuts off production of watering pots, radiator and tractor filling cans, foot baths, liquid and dry measures, dippers, ash sifters, coal hods and scuttles, utility baskets and all rubbish and ash receptacles except cans and pails of specified sizes. Dippers and liquid and dry measures may be produced for military and other essential purposes, however.

Based on the average monthly output in the year ended June 30, 1941, production of the permitted items will be cut 50 per cent. These items are garbage cans and pails; pails and buckets; wash tubs; fire buckets; wash boilers; fire shovels; funnels; refrigerator pans and kerosene storage containers.

•

Metal Lath Order

Washington

• • • **Effective on Monday,** WPB order L-59-b stopped production of metal plastering bases and accessories, now on a quota basis, for any purpose except war procurement. Makers may fabricate material for the Army, Navy, Maritime Commission, and War Shipping Administration, but only to the extent that metal plastering base and accessories are required by specifications directly applicable to purchase orders.

•

Drum Order Cleared Up

• • • **There is no** restriction on the owners's use of second-hand steel drums acquired before November 7 in accordance with Amendment No. 2 to L-197, for the packing of products listed in subparagraph (c)(4) of the order. Some misunderstanding had arisen since the issuance of Amendment No. 2 to the order (Oct. 23). On Nov. 13 Amendment No. 3 was issued to clear up the matter.

•

Office Machinery Order

• • • **Makers of** office machinery may now set their production rates for 1943, as a result of the issuance Nov. 11 of General Limitation Order No. L-54-c, as amended. The rates permissible under the new order represent adjustments made to conform to quotas estab-

Need Anything Made of
SEAMLESS TUBING?
We cold draw seamless steel and seamless alloy tubing to precision sizes, from ½ in. to 3½ in. O. D. and to almost any wall thickness from 22 gauge to half-inch.
We are equipped to fabricate this tubing by cutting, drilling, welding, bending, threading, polishing, swaging and other operations and combinations of operations.
If interested in anything made of seamless steel or alloy tubing write us. Send blueprints if possible, giving quantities desired.
Write:- WARCRAFT DIVISION • DEPT.30 •
THE BROWN FENCE & WIRE CO.
CLEVELAND, OHIO • Factory at Adrian, Mich.

Super-Sterling
BROACH SAW
The blade with GENERATING ACTION

● Skilled and unskilled workers alike are getting faster, cleaner cutting with the "generating" action of "Super-Sterling" Broach Saws. The specially designed teeth increase in height and pitch from start to finish. Each high speed steel tooth has a specific job to do—and does it efficiently. Ask your mill supply distributor about the complete line of "Super-Sterling" Metal Cutting Saws.

DIAMOND SAW WORKS, INC.
263 COURT ST., BUFFALO, N. Y.

Super-Sterling
BROACH SAW
They Dont Scratch .. They CUT

lished by the Standard Products Committee for each machine.

Machines are itemized in four lists incorporated in the order. The percentages of production of items in the first two lists (A and B) are based on average monthly dollar values of sales during 1941. Fabrication of parts for each class of machines (except repair parts) is subject to the general provisions covering the list on which it is named.

•

Wire Products Cut

Washington

• • • **Though the Department** of Agriculture requested 600,000 tons of wire products for the coming year, WPB cut this request by 60 per cent, it is reported. The department's county agents will ration all types of fencing to farmers.

Meanwhile, WPB last Thursday prohibited the manufacture of non-essential types and styles of barbed wire, wire fencing and poultry fencing. Schedule No. 3 to Order L-211 permits the manufacture of only one type of barbed wire and reduces from more than 100 to a very few, the permitted types of fencing netting and flooring. Iron and Steel Division officials said that the amount of fence produced under this program will be equal to double that amount in rodage per ton produced under the old specifications.

•

Umbrella Output Cut

• • • **Based on** 1941 consumption, WPB estimates that more than 2800 tons of high carbon steel will be saved as the result of its Order L-36, issued last Friday, limiting the output of umbrella frames to 30 per cent of last year. The order will allow production of approximately 4,000,000 men's and women's umbrellas in the next 12 months compared to 12,787,000 in 1941. The umbrellas will be generally uniform in size, shape and weight and will require about 810 tons of high carbon steel next year. The order also imposes restrictions on weight and size of umbrellas.

Top Rating for Repairs

Washington

• • • **The WPB Requirements** Committee on Nov. 11 authorized that the top priority rating of AA-1 may be applied to essential repair and maintenance. Included in the scope of the determination, which becomes a basic policy for the first quarter of 1943, are essential repairs and maintenance for productive facilities, utilities, housing and consumers' durable goods.

The action will make it possible for vital plants and factories, mines and refineries and other industrial facilities to continue effective production of both munitions of war and essential civilian goods. Communication and transportation systems, gas, oil and water lines and other services will be assured of materials to keep them performing their essential functions. Supplies and materials needed for essential maintenance and repair for housing also may be obtained.

Until the Controlled Materials Plan goes into full operation, the existing priorities system will be used to obtain the steel, copper and aluminum needed for such maintenance and repair.

•

Boiler Deadline Extended

• • • **The cut-off date** on production of low-pressure cast iron boilers using gas or oil for fuel has been postponed to Dec. 1, by action Nov. 16. Manufacture of the boilers, prohibited by L-187, originally was scheduled to end Nov. 16.

•

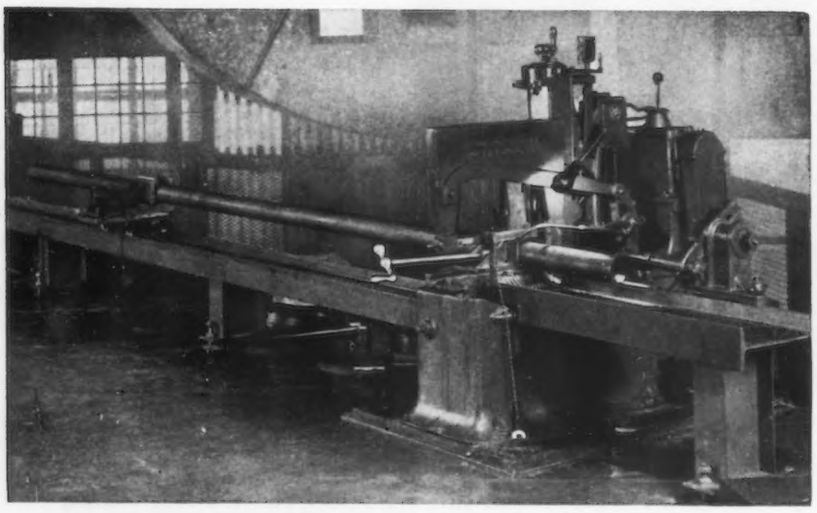
Mining Industry Aided

• • • **The United States** mining industry Nov. 16 received assurance of higher priority assistance. In cases of extreme urgency a rating of AA-1 will be assigned for repair and maintenance materials in fourth quarter of 1942. New mining machinery may be assigned AA-2X where necessary. These ratings are not blanket ratings.

•

Order Covers Scrap Weapons

• • • **To prevent** purchase and reconditioning for sale to unauthorized persons of weapons scrapped by the military services some time ago, Limitation Order L-230 has been issued prohibiting their sale except to authorized purchasers.



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For cast automatic production or for single-cut miscellaneous work, MARVEL 6A or 9A Hack Saws are fast, accurate tools. Capacities 6" x 6" or 10" x 10", single or nested bars. Write today for Bulletin N. 600.

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"The Hack Saw People"
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Eastern Sales Office:
225 Lafayette St., New York

Accord Reached on Prices of War Goods

• • • **An arrangement** regarding control over prices of war goods along lines already in effect was announced Nov. 15 by the War and Navy Departments and the OPA. In general, OPA will refrain at this time from further extension of its controls over military materials and services. Military items, their subassemblies and parts, which now are exempt from OPA regulations, will in general be left to control by the War and Navy Departments. Materials, subassemblies and parts of these items, and finished goods that have close civilian counterparts, which now are under OPA regulations, will in general remain there with special provisions for price adjustments under Procedural Regulation No. 6.

The Armed Services will furnish to OPA information on prices and procurement procedures for items under Army and Navy control. Firms selling military items should take care to determine whether their sales are subject to OPA regulations or are under price control of the War and Navy Departments.

•

Drawback Is Set On Ferromanganese

• • • **Sellers of** standard ferromanganese, made from dutiable ore, to a governmental agency for shipment outside the United States may charge the full $135 per gross ton maximum price for the commodity only if they assign the duty "drawback" privilege to the agency, the OPA announced Nov. 13.

Assigning of the "drawback" privilege to the government agency would permit the agency to obtain a refund of the import duty paid on the ore. If sellers do not make such an assignment, the $135 per gross ton price must be reduced by $10.

Also, if the standard ferromanganese had been made from ore on which no duty was paid because it was left in a bonded warehouse, and if the standard ferromanganese is still in a bonded warehouse and is shipped in bond without payment of duty on the ore, then the maximum price must likewise be reduced by $10 per gross ton. These pricing provisions are established in Regulation No. 138 (Standard Ferromanganese) through Amendment No. 3, effective Nov. 13.

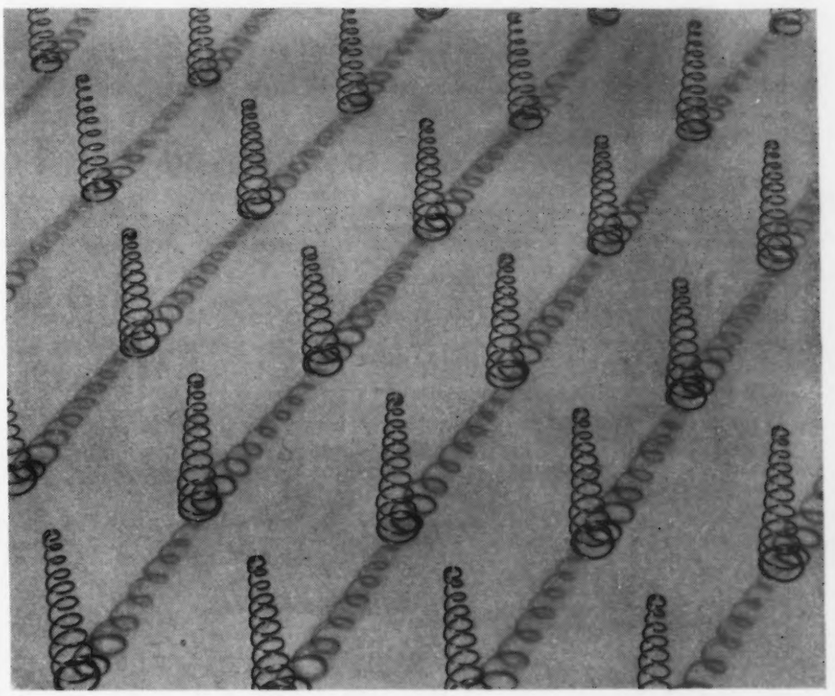
•

Tool Dealers Register

Washington

• • • **OPA last week mailed 2000** certificates of registration to persons selling second-hand machine tools or extras, or second-hand machines or parts. They were the first certificates to go out under OPA's requirement that all dealers in this class, automatically licensed under Supplementary Order No. 20, must register on OPA Form No. SO 20:3. The order includes persons selling as principal agents, brokers or auctioneers.

Persons who have not yet registered were warned that they should do so without delay before



MODERN SPRINGMAKERS require a degree of accuracy in their product that was until recently unknown. Today each type of spring is designed in minute detail to fit the job.

And then, when space limitations, load, deflection, operating temperature and atmosphere have determined the physical specifications, progressive springmakers turn to a Torrington Spring Coiler to produce uniform springs meeting the requirement exactly.

Special attachments for Torrington Spring Coilers enable rapid, accurate production of many types of springs impossible or impractical to make on any standard coiler.

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

This Week's Priorities and Prices

Construction machinery has been placed under WPB control with the issuance of Order L-192 on Nov. 9. (WPB-2126)

Baling and briquetting premiums for segregated aluminum scrap were established in Amendment No. 4 to Revised Price Schedule No. 2 as amended, effective Nov. 16. (OPA-T-283)

Steel consumers have been urged to use, wherever possible, steel made by the bessemer process or re-rolled from old rails, instead of open-hearth steel. (T-1182)

Scrap prices may be automatically adjusted when such adjustment is necessary in war production, under Amendment No. 1 to Supplementary Order No. 9, effective Nov. 14. (OPA-1103)

Tin oxide and tin anode prices were established as f.o.b. Barber, N. J., instead of f.o.b. point of shipment, as originally issued, under Amendment No. 1 to Order No. 4 under MPR 204, effective as of Oct. 15. (OPA-T-290)

Specially prepared brass mill scrap buyers other than brass mills, ingot makers, and copper refineries have been given a simplified procedure for determining prices for such material in Amendment No. 4 to Revised Price Schedule No. 12, effective Nov. 19. (OPA-T-295)

Metal plastering base production has been halted as of Nov. 16 except for certain limited uses on military projects, under order L-59-b. (T-1199)

Maximum prices for special "trade name" brass and bronze alloy ingots which are produced by persons other than those considered in the trade as ingot makers have been established in Amendment No. 1 to Maximum Price Regulation No. 202, retroactive to Aug. 19. (OPA-T-307)

■ ■ ■

For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 *means announcement* 600 *issued by the War Production Board.)*

Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of October 8 to bring the Guide up to date.

"M" Orders:

M-38-c...Amendment No. 2 (11-11-42) permits a number of essential uses of lead which heretofore have been restricted.

M-72-a...Interpretation No. 1 (11-10-42) defines the permissible practices for crown cap manufacturers in recovering No. 10 cans for crown cap manufacture.

M-99...Amendment No. 1 (11-13-42) permits increased use of zinc by newspapers and others using zinc plates in printing.

M-161.. Amendment No. 7 (11-12-42) removes inventory restrictions on sodium sulphate.

M-193...Sets up certain standards of production efficiency in glycerin recovery (11-9-42).

"P" Orders:

P-118...Amendment (11-12-42) assigns higher preference ratings for equipment, maintenance and repair material for processors of dairy products.

"L" Orders:

L-7-c...Order increases ice box production to provide equipment for military, naval, lend-lease and economic warfare needs (11-14-42).

L-18-c...Interpretation (11-12-42) defines carriers' responsibility under order.

L-23-c...Amendment No. 4 (11-10-42) permits an increase in output of domestic use stoves.

L-28-a...Interpretation standardizes production of lamp bulbs (11-14-42).

L-36...Order cuts production of umbrellas to 1/3 of what it was in 1941 (11-12-42).

L-54-c...Amended order establishes rate of production of office machinery (11-11-42).

L-59-b...Order stops production of metal plastering bases and accessories on Nov. 16 (11-12-42).

L-82...Revoked (11-9-42).

L-82-a...Revoked (11-9-42).

L-112-a...Amendment No. 1 (11-10-42) adds 9 manufacturers to list of those permitted to produce and distribute certain specified approved standard models of industrial power trucks.

L-192...Places all construction machinery and equipment under allocation control (11-9-42).

L-197...Amendment No. 3 (11-12-42) states there is no restriction on owner's use of second-hand steel drums acquired before Nov. 7.

L-211...Schedule No. 3 (11-11-42) provides for further restrictions on the production of certain wires used for farm purposes.

a penalty for late registrations is imposed.

•

Chrome Ore Prices

• • • At New York last week prices of chrome ores were being quoted on the following basis, in conformity with new government price control regulations:

Per Dry Gross Ton

F.O.B. Cars at New York, Philadelphia, Baltimore, Charleston, S. C.; Portland, Ore.; Tacoma, Wash.
(Prices are subject to penalties if ratio and silica guarantees are not met)

Indian and African 48% ore with ratio of 2.8:1	$41.00
" " " 48%, 3:1	43.50
" " " 48%, no ratio	31.00
So. African Transvaal, no ratio, 44%	27.40
" " " 45%	28.30
" " " 48%	31.00
" " " 50%	32.80
Brazilian, 44%, 2.5:1	33.65
" 48%, 3:1	43.50
Rhodesion, 45%, no ratio	28.30
" 48%	31.00
" 48%, 3:1	43.50
Domestic, 48%, 3:1	43.50

(Less $7 per ton railroad freight allowance)

Steel Contracts Reopened

• • • While no definite price renegotiations have been completed as yet, initial steps are now under way by the Army to renegotiate war contracts with various steel companies. It is understood that several companies already have been approached and are mapping out plans to comply with this large undertaking.

It is reported unofficially that contracts which will be under scrutiny for possible renegotiation include those which involve steel products going into direct war requirements, that is, needs which are directly traceable to items used by the Army. The amount of book work necessary to embark on such a renegotiating program is said to be substantial. Information concerning cost of manufacture, etc., on specific contracts must be furnished by the steel companies involved and evidence presented that no exorbitant profit was realized.

•

High Cost Ovens Listed

• • • High cost producers of beehive oven coke in Pennsylvania who qualify for a special delivered ceiling price of $6.50 per ton f.o.b. cars at ovens plus transportation charges from Connellsville were listed by OPA recently.

The special price was established Aug. 12, by OPA to avert a threatened shortage of the coke, which is essential in steel production. The ceiling price for the balance of all the production is $6 per ton. The special high-cost production price was established in Amendment No. 2 to Revised Price Schedule No. 77.

In order to qualify for the extra price producers must be operating hand-drawn ovens and must necessarily receive their entire supply of coal by truck from the mines.

Draft Drain on Manpower Solved; Longer Work Week Predicted

• • • **The struggle** to get the manpower problem under control reached a new high in activity this week with some substantial actions and a number of movements which are certain to have some effect within the next few months.

Most substantial of the accomplishments is the announcement of the Manning Table Plan for controlling deferments. This plan which was developed jointly by the War Manpower Commission and the Selective Service working with the American Iron and Steel Institute, is designed to take every able-bodied man of draft age out of industry for service in the Army on a basis which assures deferments to the qualified worker for a period sufficient to train a replacement as determined by approved job analysis. The Manning Table itself is simply a plant-wide job analysis to be prepared by industry for guidance of the local draft boards in making decisions on deferment. Men working at jobs requiring less than six months' training will no longer be considered for deferment. Operation of this plan should remove the friction between industry and the draft boards; assure the Army of all eligible men; stop the starving of industry for skilled workers over a period of time.

Still needed to complete the picture of industry versus the armed services on the manpower subject is strict control of free enlistment.

Second most important move affecting manpower is the word at press time that the 18-19 year draft bill has been cleansed of the 1-year compulsory training period and has been sent to the White House for signing. When this bill goes into effect some 2,500,000 young men, part in industry, part in school, will soon go into the Army. What drain this will make on industry is not accurately known but it will be considerable and will particularly effect training programs which have concentrated on young workers.

An important by-product of the manpower shortage is revealed in the announcement of the Allison division of GMC that shortage of skilled workers was forcing them to turn to two 10-hr. shifts instead of the usual three 8-hr. shifts. They report that production will not be impaired by this change.

The Truman Senate investigating committee cracked through this week with sharp criticism of the failure of the WMC to set suitable policies or programs to combat the manpower problem. Counter suggestion from the committee called for a change to a 48-hr. work week instead of the country's present average 42.5-hr. week. This increase in working hours suggested greater productivity from the present work force and a consequent trimming of the demand for more workers as the result. This resolution will undoubtedly be adopted soon since foreign comparisons of 56 to 70-hr. work weeks are being drawn. Overtime pay, always the catch in ideals toward lengthening the work week, will be paid in War Bonds good in ten years or usable for current taxes, according to the suggested plan. This plan, or

Pig Iron Output for 36 Companies Sets Record in October

• • • **Pig iron production in October reached its highest peak this year, with 36 companies or 99.8 per cent of the total blast furnaces, producing 5,165,012 tons, according to the American Iron and Steel Institute. For the first time in 1942, production the past month was above the 100 per cent of capacity, having reached 101.6 per cent, with the average for 10 months at 98.7 per cent. There were 71,596 tons of ferromanganese and spiegeleisen made compared with 47,539 tons in September and 65,966 tons in March, the previous high for 1942.**

Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			Pig Iron		Ferro Manganese and Spiegel		Total		Percent of Capacity	
			Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date
Distribution by Districts:										
Eastern	11	11,967,680	972,602	9,321,700	16,983	193,054	989,585	9,514,754	97.3	96.3
Pittsburgh-Youngstown	15	24,346,420	2,132,200	20,059,967	29,066	194,033	2,161,266	20,254,000	104.5	99.9
Cleveland-Detroit	9	6,068,470	562,980	5,097,568	.....	.....	562,980	5,097,568	109.2	101.4
Chicago	6	12,954,800	1,059,878	10,556,574	13,881	45,216	1,073,759	10,601,790	97.6	98.4
Southern	7	4,521,910	359,165	3,410,093	11,666	95,629	370,831	3,505,722	96.5	96.4
Western	2	822,800	78,187	687,140	.....	4,189	78,187	691,329	111.8	91.1
Total	36	60,682,080	5,165,012	49,133,042	71,596	532,121	5,236,608	49,665,163	101.6	98.7

During 1941 the companies included above represented 99.8 per cent of the total blast furnace production.

some modification is almost a sure bet for adoption soon.

•

Staggered Hours Start In Buffalo Nov. 16

Buffalo

• • • **Workers in Buffalo's** heavy industries, mostly located in one segment of the city, will start their day shift at 7.30 a. m. instead of 8 a. m., beginning November 16th, to help relieve the public transportation problem.

Starting the shift half an hour earlier has been approved by the New York State War Council after weeks of local wrangling over a proposal to make war industry workers begin their day shift at 6.30 a.m. The 6.30 proposal had been flatly rejected by labor and management.

•

Longer Week Urged By Two Authorities

• • • **A longer work week** than the present 40-hour schedule was urged by at least two authoritative speakers this week as the immediate answer to the manpower shortage.

Walter D. Fuller, chairman of the National Association of Manufacturers demanded a more realistic attack on the manpower problem and called for elimination of the 40-hour week which he described as a share-the-work plan devised during the depression. He pointed out that the Russians are working 66 hours; the Germans 60 hours; and the British 56 hours per week. According to his estimates, drawn from WPA figures, increasing the work week to 48 hours would be the equivalent of adding 4-million more workers; by increasing to a 56-hour week, the same as adding 8-million workers.

Edward A. O'Neal, president of the Farm Bureau Federation, urged a 54-hour work week, stating that by so doing we could add 25 per cent to the effective industrial manpower of this country.

New Output Record Set in October

ALL PREVIOUS RECORDS for total steel production were broken by a substantial margin in October as the steel industry of the United States exceeded its rated capacity by producing 7,584,864 tons of steel ingots and castings, the American Iron & Steel Institute announced. The announced tonnage produced in this country during October is about 385,000 tons greater than the estimated yearly capacity of the entire steel industry of Japan. Production of steel in the United States during October was 7 per cent higher than the September total of 7,067,084 tons and exceeded by nearly 349,000 tons the output in October of last year. Before the production of last month's record-braking total, the previous peak month was March of this year when 7,392,911 tons were produced. During October the steel industry operated at an average of 100.1 per cent of its rated capacity, which compares with operating rates of 96.5 per cent of capacity in September and 98.9 per cent of capacity in October a year ago. An average of 1,712,159 tons of steel was produced per week in October, as against 1,651,188 tons per week in September and 1,633,424 tons per week in October 1941.

YEAR 1942

Based on Reports by Companies which in 1941 made 98.5% of the Open Hearth, 100% of the Bessemer and 87.8% of the Electric Ingot and Steel for Castings Production

Period	Estimated Production—All Companies								Calculated weekly production, all companies (Net tons)	Number of weeks in month
	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL			
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,328,128	95.4	490,864	86.0	305,930	96.3	7,124,922	94.7	1,608,335	4.43
February	5,791,813	96.7	453,543	88.0	275,700	96.2	6,521,056	96.0	1,630,264	4.00
March	6,574,701	99.1	493,294	86.4	324,916	102.3	7,392,911	98.2	1,668,829	4.43
1st Quarter	*18,694,642*	*97.0*	*1,437,701*	*86.7*	*906,546*	*98.3*	*21,038,889*	*96.3*	*1,635,994*	*12.86*
April	6,346,707	98.8	454,583	82.2	321,023	104.4	7,122,313	97.7	1,660,213	4.29
May	6,600,376	99.5	454,054	79.5	332,460	104.7	7,386,890	98.2	1,667,470	4.43
June	6,247,302	97.2	452,518	81.8	322,335	104.8	7,022,155	96.4	1,636,866	4.29
2nd Quarter	*19,194,385*	*98.5*	*1,361,155*	*81.2*	*975,818*	*104.6*	*21,531,358*	*97.4*	*1,654,985*	*13.01*
1st 6 months	*37,889,027*	*97.8*	*2,798,856*	*83.9*	*1,882,364*	*101.5*	*42,570,247*	*96.9*	*1,645,545*	*25.87*
July	6,350,047	95.7	453,684	79.6	345,093	96.3	7,148,824	94.5	1,617,381	4.42
August	6,420,496	96.6	467,313	81.8	345,642	96.3	7,233,451	95.4	1,632,833	4.43
September	6,297,201	98.0	437,950	79.4	331,933	95.7	7,067,084	96.5	1,651,188	4.28
3rd Quarter	*19,067,744*	*96.8*	*1,358,947*	*80.3*	*1,022,668*	*96.1*	*21,449,359*	*95.5*	*1,633,615*	*13.13*
9 months	*56,956,771*	*97.4*	*4,157,803*	*82.7*	*2,905,032*	*99.5*	*64,019,606*	*96.4*	*1,641,528*	*39.00*
October	6,757,696	101.6	461,895	80.9	365,273	101.7	7,584,864	100.1	1,712,159	4.43
November										4.29
December										4.42
4th Quarter										*13.14*
2nd 6 months										*26.27*
Total										52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons Bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, Bessemer 6,721,400 net tons, Electric 4,225,890 net tons.

PERSONALS . . .

• **Carl A. Salmonsen,** in charge of one of the manufacturing divisions since 1941, has been appointed assistant manager of the Lynn, Mass., River Works of the General Electric Co. Mr. Salmonsen has been with General Electric since 1909, when he entered the employ of the company as an office boy at Schenectady. Two years later he took the G-E apprentice machinists' course. From toolmaker, he was promoted to assistant foreman, assistant to the superintendent of section K, Schenectady, general foreman of the punch press department and in 1925 superintendent of the punch press work. In 1928 he was sent to the Peterborough Works of the Canadian General Electric Co., Ltd., as general superintendent, and two years later became manager of that plant.

• **Robert A. Murdock** has been made service engineer of the Claud S. Gordon Co., Chicago. Mr. Murdock for the past two and one-half years has been with the Jones and Laughlin Steel Corp., as instrument manager.

• **W. A. Becker,** former regional field man at Milwaukee for the WPB salvage division, has been appointed executive secretary of the Wisconsin salvage section to succeed **W. E. Simon** who was promoted to the position of regional general salvage chief. Mr. Becker is on leave of absence from Bendix Home Appliances, Inc.

• **E. E. Michaels,** manager at Birmingham for the Chicago Bridge & Iron Co., has been named chairman of the industrial salvage committee of Associated Industries of Alabama. Mr. Michaels succeeds **Warren Whitney,** manager of National Cast Iron Pipe, division of James B. Clow & Sons, who recently was elected association president.

• **George C. Johnson,** president of Enamel Products Co., Cleveland, has been elected president of Cleveland Hobbing Machine Co., succeeding Carl W. Blossom, who died a few weeks ago. Mr. Johnson will retain his position as head of the Enamel Products Co., with which he has been associated for 27 years. His election as head of Cleveland Hobbing Machine Co. will maintain the close relationship that has existed between the two companies for many years. Mr. Johnson, a graduate of Yale University, has been president of Enamel Products Co. since 1915.

• **John C. Cushing** has been appointed assistant manager of industrial relations of Scully Steel Products Co., U. S. Steel subsidiary. Mr. Cushing went to Scully in 1940 as a clerk in the personnel department. In March, 1942, he was appointed assistant to the director of industrial relations, the position he has held until receiving his present post.

CARL A. SALMONSEN, assistant manager of the Lynn, Mass., River Works of G-E.

• **D. A. MacKinnon** has been appointed sales manager of Hydraulic Machinery, Inc., Detroit. His earlier experience in the field of hydraulics includes five years with Vickers and six years with Sundstrand. Since 1940 he has been with Sundstrand as a sales engineer.

• **John Berry, Jr.,** assistant treasurer at Bell Aircraft Corp., has been appointed to the new company office of comptroller. Before going to Bell Aircraft approximately a year ago, Mr. Berry was assistant manager of the Buffalo office of Price, Waterhouse & Co., and prior to that was in the Philadelphia office of the same firm.

• **Edwin H. Brown,** engineering vice-president of the Allis-Chalmers Mfg. Co., has been named assistant chief of the WPB Iron and Steel Branch, in charge of the plant facilities section. Mr. Brown succeeds **Don N. Watkins,** who resigned to return to his post as president of Steel Publications, Inc. During his absence, **Forrest Nagler,** chief mechanical engineer, will be in charge of the Allis-Chalmers engineering and development department.

• **D. L. Beeman** has been appointed engineer, industrial power section, succeeding **E. G. Merrick,** and **R. S. Sage,** application engineer in the mining section since 1940, has been named engineer, mining section, succeeding **F. L. Stone.** Mr. Beeman entered the employ of the General Electric Co. in September, 1929, as a student engineer on the company's test course at the Schenectady plant. Since November, 1941, Mr. Beeman has been an application engineer in the industrial power section, specializing in industrial power distribution problems. Mr. Sage also joined General Electric at Schenectady as a student engineer on test.

• **George M. Stevens,** assistant manager of the G-E River works since 1940 has been named acting manager and **Nicholas M. Du Chemin,** assistant manager, has been appointed acting manager of the company's West Lynn works, both at Lynn, Mass. They succeed the late Nelson J. Darling, who was manager of both plants for several years.

• **Karl Landgrebe,** who recently retired as vice-president of the Tennessee Coal, Iron & Railroad Co., Birmingham, has been appointed vice-president of Goslin-Birmingham Mfg. Co., Birmingham. Mr. Landgrebe retired on Aug. 17 as a vice-president of the U. S. Steel Corp. subsidiary after 43 years of service.

• **Ralph Horn** has been appointed manager of the new East Birmingham plant of the Southern Steel Works Co., Birmingham. Mr. Horn, superintenent of steel erection for Southern Steel from 1927 to 1931,

returned to the latter company from Republic Steel Corp.

• **Dan C. Hungerford** has been elected president and general manager of Aircraft Parts Development Corp., Summit, N. J. Until recently, when he resigned to help organize the corporation which he now heads, he was vice-president and a director of the Elastic Stop Nut Corp., Union, N. J. Prior to that, he was president of the Standard Mfg. Co., Corning, N. Y.

• **W. L. Davis** has been elected a member of the board of directors of Scully Steel Products Co., U. S. Steel subsidiary. Mr. Davis has been connected with the corporation subsidiaries since 1905 when he began as a shipping clerk at the Donora, Pa., plant of the Carnegie Steel Co. He was appointed manager of American Steel & Wire Co.'s Houston, Tex., warehouse in 1928, and after serving in this capacity for nine years, he was made superintendent of the Texas warehouse of the Tennessee Coal, Iron & Railroad Co. He has been manager of operations for Scully since Aug. 1.

• **Charles Nelson, Jr.,** has been made chief engineer of the Ahlberg Bearing Co., in charge of bearing design and development work. Following his graduation from Armour Institute Mr. Nelson joined the engineering staff of Marlin-Rockwell Corp., where he remained until 1931 when he joined Ahlberg. In 1933 he was appointed assistant chief engineer, and continued in that position until the present time.

• **Herman C. Frentzel,** chief engineer, and **Charles G. Eisenberg,** chief of the body and hoist division of the Heil Co., Milwaukee, have been promoted to the positions of works manager and chief inspector, respectively.

• **Paul H. Stocker** has joined the H. F. Stocker Co., iron and steel scrap broker in Pittsburgh.

• **W. T. Burgess** has been named to the position of advertising manager of Denison Engineering Co., Columbus.

• **John L. Schmeller,** formerly executive vice-president has been elected president of the National Bronze & Aluminum Foundry Co., Cleveland. Also elected were: **W. F. Muth,** vice-president and secretary, **George N. Wright,** vice-president and **George C. Hilliard,** comptroller.

• **W. E. Griffiths,** formerly manager of the product development department, has been made assistant manager of sales, flat rolled products, Allegheny Ludlum Steel Corp.

• **Chester D. Moore** has recently been appointed industrial relations manager of the Sharon Transformer Division of the Westinghouse Electric & Mfg. Co. Prior to his promotion to the Sharon post, Mr. Moore was supervisor of industrial relations at the Merchant Marine Works of Westinghouse's South Philadelphia plant. He replaces **J. T. Burke,** who has been transferred to the Canton Division of Westinghouse.

• **Roy C. Yantis** has joined the development engineering staff of the Wolverine Tube division of Calumet & Hecla Consolidated Copper Co., Detroit. He will serve as a mechanical engineer. Mr. Yantis goes to Wolverine from the Gibson Refrigerator Co.

• **E. L. Midgette** has been named consultant for the American Engineering Co. He was an engineer for the U. S. Rubber Reclaiming Co., Inc., Buffalo; instructor of machine design at Johns Hopkins University; and professor in charge of laboratory sciences at St. Johns College, Annapolis.

Hauck Assistant Chief Steel Control Section; CMP

Washington

• • • **W. A. Hauck** has been appointed assistant chief of the Steel Control Section of the Controlled Materials Plan recently adopted by WPB, by H. G. Batcheller, director of the Steel Division.

Mr. Hauck came to Washington in June, 1940, as assistant group executive of the Steel Branch of the Advisory Commission to the Council of National Defense. He was subsequently steel consultant for OPM and handled the Steel Expansion Program. Under WPB he was chief of the Planning Unit and chairman of the Plant Facilities Committee of the Iron and Steel Branch. Mr. Hauck was formerly with Bethlehem Steel Co. and Lukens Steel Co.

OBITUARY . . .

• **Earl H. McCarty,** former president of the Nash Motors Co., Kenosha, Wis., died following a heart attack. He became president of the firm in 1932, when C. W. Nash relinquished the post. He was 56 years old.

• **James W. Fitzgerald,** research engineer for the Briggs & Stratton Corp., Milwaukee, died suddenly Nov. 2, aged 65 years.

• **Norbert A. Milhaupt,** superintendent of the milling machinery department of the Kearney & Trecker Corp., Milwaukee, died Nov. 1 at a hospital in Burlington, Wis., after a short illness. He was 57 years old.

• **F. Anton Drolshagen,** founder and president of the Milwaukee Pattern Mfg. Co., Milwaukee, died at a hospital there after a long illness Nov. 1. He was 83 years old.

• **H. A. Stringfellow,** of the War Production Board in Boston, died Nov. 4. Mr. Stringfellow did civil engineering work in United States, Japan, China, the Philippine Islands and South America from 1917 to 1926. From then until 1930 he had been engaged in developing the compacting presses for rounding and compacting the cables of the George Washington Bridge for the Southwark Foundry & Machine Co. Following this until 1934, he had been in charge of special machinery division, Elevator Supplies Co. In 1935 he started investigation and research work on back pull drawing from which the present reactive wire drawing method has developed.

• **William Salt,** for many years head of the service department of the De Laval Steam Turbine Co., Trenton, died suddenly on Oct. 31. Mr. Salt had been one of the oldest De Laval employees in point of service, having been associated with the company for more than 40 years.

• **M. Lloyd Hollister,** president, W. S. Rockwell Co., died Oct. 31.

• **Austin D. Bostick,** formerly president of the Bostick Foundry Co. at Lapeer, Mich., died at his home in that city of a heart ailment. He was 73 years old.

The Iron Age Critical Tool Locating Chart

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Compiled from latest WPB data on available machine tool capacity.

CRITICAL TOOLS	REGIONAL OFFICES—WAR PRODUCTION BOARD											
	Total	No. 1 Boston	No. 2 New York	No. 3 Philadelphia	No. 4 Atlanta	No. 5 Cleveland	No. 6 Chicago	No. 7 Kansas City	No. 8 Dallas	No. 10 San Francisco	No. 11 Detroit	No. 12 Minneapolis
BORING												
Horizontal—3" Bar	50,994	7,383	9,309	6,445	.....	10,328	7,052	1,356	1,829	2,281	3,986	1,025
" —To 4" Bar and Over	60,734	5,761	5,859	9,900	.....	18,302	6,760	3,645	2,084	3,529	3,549	1,345
Vertical—54"	38,547	4,482	6,300	5,069	.....	8,487	4,035	3,988	1,529	972	1,438	2,247
" —To 84"	53,564	4,234	5,701	8,583	.....	13,680	5,114	3,749	3,514	5,242	2,126	1,621
" —To 120"	18,085	1,879	2,527	2,451	.....	5,329	2,148	1,471	472	606	822	380
" —Over 120"	5,392	.....	782	1,337	.....	1,753	849	346	37	.....	120	168
Jig Borers	32,783	8,139	6,862	2,747	.....	5,123	4,650	961	114	746	3,152	289
Misc. Precision—Heald—Ex-Cell-O type	20,792	1,663	973	1,512	.....	8,816	3,686	1,422	220	1,412	812	276
BROACHING	76,896	15,175	10,537	5,728	.....	16,089	12,468	3,708	1,102	2,384	7,880	1,825
DRILLING												
Radial 6' to 8' Radius	70,280	7,198	9,266	11,149	.....	20,776	7,862	4,980	3,080	1,030	3,417	1,522
Over 8' Radius	4,193	138	394	1,186	.....	292	96	432	1,007	.....	588	60
DUPLICATING AND PROFILING	29,716	11,029	6,340	3,899	.....	3,993	3,016	445	.....	384	472	138
FORGING												
Drop—Hammer—Board 100 lb. up	117,571	40,324	30,245	9,752	.....	22,740	9,642	1,184	712	1,370	584	1,020
Steam 5000 lb. up	13,850	2,447	1,275	757	.....	3,555	703	.....	50	172	4,383	508
Press—Forging—Steam Hydr. 500 ton	6,958	1,142	1,686	48	.....	2,323	1,397	116	.....	68	178	.....
GEAR CUTTING												
Gear Hobbers—48" and up	24,308	2,260	1,249	3,236	.....	7,109	3,448	2,287	733	1,702	1,600	684
Bevel Gear Cutters	51,846	10,762	4,891	7,679	.....	13,563	8,191	1,680	544	973	3,239	324
GRINDERS												
Centerless	36,360	8,133	2,716	3,311	.....	7,433	4,573	2,202	277	1,063	6,436	216
External Cyl.	416,374	99,154	70,404	39,826	.....	61,639	51,138	24,850	5,500	14,116	35,113	14,634
Internal Cyl.	142,655	28,252	16,300	12,347	.....	22,157	20,649	12,816	4,494	8,196	13,249	4,195
Thread	3,997	929	894	676	.....	632	350	.....	168	216	132	.....
LATHES												
Engine—24" Dia.—Over 60" c.-c.	222,395	34,041	31,340	29,428	.....	49,638	24,398	15,023	14,929	7,469	7,917	8,212
" Over 24" Dia.—To 60" c.-c.	89,370	14,572	18,298	10,355	.....	15,250	11,152	9,306	1,664	2,913	3,331	2,529
" —Over 24" Dia.—To 96" c.-c.	145,170	18,120	25,701	15,631	.....	34,092	13,070	15,189	8,016	7,043	4,670	3,638
" —Over 24" Dia.—Over 96" c.-c.	357,648	49,179	49,937	57,631	.....	71,722	29,675	33,227	26,742	18,706	12,821	8,008
Turret—12" Dia. 2½" Bar and up	95,169	13,304	21,445	13,850	.....	19,640	10,974	4,270	1,362	1,039	6,648	2,637
" —To 24" Dia. 2½" Bar and up	172,162	22,569	23,748	22,252	.....	31,666	18,319	16,373	8,976	10,803	10,077	7,379
" —Over 24" Dia. 2½" Bar and up	41,929	3,323	4,562	6,230	.....	8,078	6,327	3,745	2,798	4,686	1,174	1,006
Automatic—12" Diameter	17,088	2,485	2,221	664	.....	811	6,095	1,134	.....	780	2,608	290
" —To 24" Diameter	19,729	2,002	1,812	226	.....	1,731	2,045	402	.....	3,646	6,776	1,089
" —Over 24" Diameter	1,779	.....	90	216	.....	.....	1,473	.....	.....	.....	.....	.....
SCREW MACHINES												
Automatic—Single 1"	82,167	14,517	30,054	8,515	.....	11,682	9,752	2,431	552	204	3,010	1,450
" —Single to 3"	72,546	13,920	11,080	8,145	.....	13,327	15,550	3,876	936	1,694	3,522	496
" —Single—Over 3"	17,578	2,522	1,932	2,121	.....	2,065	7,183	192	108	500	955	.....
" —Multiple—To ⅞"	6,438	1,654	617	1,452	.....	582	312	.....	.....	.....	1,821	.....
" —Multiple—To 1"	103,957	19,873	20,125	9,881	.....	16,800	14,845	3,574	.....	1,970	15,997	892
" —Multiple—To 3"	69,950	10,387	10,369	8,572	.....	15,316	12,988	4,113	.....	2,292	5,472	441
" —Multiple—Over 3"	6,357	3,151	120	116	.....	1,144	458	.....	.....	300	620	448
MILLING												
Standard Type—Horizontal—No. 3	234,213	42,975	43,303	23,446	.....	42,262	31,092	14,244	6,638	6,596	16,592	7,065
" " —Horizontal—Over No. 3	111,962	14,763	18,421	18,765	.....	22,906	9,612	6,555	3,461	6,441	8,103	2,935
" " —Vertical—No. 3	42,309	12,016	5,784	3,069	.....	8,186	6,069	1,532	260	714	4,324	355
" " —Vertical—Over No. 3	47,398	13,230	3,848	7,029	.....	9,537	5,362	1,129	642	1,163	4,566	892
Mfg.—Horizontal—12" table width	29,598	9,535	5,075	1,438	.....	4,076	5,446	980	120	993	1,165	770
" —Horizontal—Over 12" table width	18,711	2,972	2,164	913	.....	5,541	4,806	732	164	458	744	217
Planer—Over 30" table width—slab mill	7,787	1,902	1,413	954	.....	2,050	176	496	.....	.....	184	612
" —Over 30" table width—side spdl.	3,057	760	158	931	.....	185	231	144	168	216	.....	284
" —Over 30" table width—vert. spdl.	7,292	1,896	1,563	867	.....	1,379	307	.....	108	.....	558	614
" —Over 30" table width—side and vert.	8,494	1,140	1,050	825	.....	2,303	1,763	192	144	168	777	132
Misc. and Dia. Cutting—Heller Type	21,286	5,921	6,105	1,404	.....	4,742	1,202	308	.....	688	916	.....
PLANERS												
60" wide to 15'	10,988	978	1,217	1,884	.....	2,852	1,827	1,046	696	258	230	.....
60" wide, over 15'	5,546	626	504	840	.....	1,356	928	554	272	68	230	168
Over 60" wide to 15'	2,946	278	482	789	.....	582	168	202	37	96	144	168
Over 60" wide, over 15'	7,921	1,522	1,152	2,286	.....	1,965	232	174	.....	88	174	328
THREADERS												
External Mills	29,727	6,394	3,590	3,173	.....	4,284	3,227	584	928	2,590	3,539	1,118
Internal Mills	4,154	66	209	465	.....	1,198	1,260	608	288	60	.....	.....
TOTAL AVAILABLE HOURS	3,390,716	603,077	543,999	402,301	.....	663,067	416,151	213,973	107,475	131,104	222,941	86,630

The available critical tool hours per week here shown are based on an 168-hour week and represent usable tool hours subject to operating labor available. Reports are based on initial inspection of the plants concerned by engineers trained for this work. The War Production Board Field Offices are acting as clearing houses for all public or private contractors or agencies interested in using these facilities.

When making inquiries regarding the availability of these critical tool hours for specific jobs, communicate in detail with the Regional Supervisor, Critical Tools Service, in the WPB Region best located for your job. They are:

Region	*Supervisor*	*Assistant*	*WPB Office*
No. 1 Boston	R. F. Wood	H. H. Whitcomb	17 Court Street
No. 2 New York	J. J. Carroll	C. Philippi	122 E. 42nd Street
No. 3 Philadelphia	C. E. Reinicker	R. V. Hilands	1617 Penn. Blvd.
No. 5 Cleveland	C. J. Perrier	C. R. Griffith	Union Commerce Bldg.
No. 6 Chicago	S. C. Bloom	W. I. Buhl	20 N. Wacker Dr.
No. 7 Kansas City	W. A. Crooks	P. J. Leonard	Mutual Interstate Bldg.
No. 8 Dallas	B. P. Rhineford	W. E. White	4th Fl., Fidelity Bldg.
No. 10 San Francisco	M. Brookman	S. W. Liftchild	1355 Market St.
No. 11 Detroit	R. O. Cunningham	J. B. Shepard	7310 Woodward Avenue
No. 12 Minneapolis	E. H. Pitney		326 Midland Bk. Bldg.

MACHINE TOOLS

. . . Sales, Inquiries and Market News

Lack of Facilities Hampers Use of Women

Cincinnati

• • • **With draft boards** scraping the bottom of the barrel for army personnel, the problem of retaining adequate employees in local machine tool plants is becoming increasingly difficult. Some plants, where facilities are able to take care of women employees, have small forces operating in tool and supply rooms, as inspectors and in some instances running machines, but the general use of women in the industry has not been adopted. This is because of the fact that many plants have no means of taking care of women employees and it would be necessary to alter their layout or at least add some building space for washrooms and locker rooms and similar facilities. In plants employing women, some complaint is heard over the inability of women to do the work, particularly close precision work, since the women seem to lack patience in keeping steadily alert for the necessary adjustments and detailed checkups required.

New business continues to flow in at about the production rate and in some instances manufacturers indicate that they are eating slowly into their backlogs.

•

Drafting of Key Men Laid to Lack of Policy

Chicago

• • • **The drafting of trained** mechanics and supervisors from machine tool plants is increasing at such a pace that it is feared that it may jeopardize output in the near future in some plants. Machine tool executives have little complaint about the need of such men for the armed forces, but they do criticise the lack of any exact definition of what type of work is subject to deferment as "essential." Lacking this definition, it is not possible to lay intelligent plans for training replacements for key jobs.

Then, too, many draft boards have of late been inclined to be more arbitrary in their judgment of individual cases. The fact that most draft boards in machine tool areas are totally unacquainted with machine tool production and are making little or no effort to understand the subject, adds further confusion to the picture. It has been suggested that draft boards should make use of advisers who are acquainted with manufacturing processes so that decisions could be made on practical grounds, instead of on the arbitrary basis that is now in general use.

•

Tool Builders Face Drop In Steel and Iron Supplies

Cleveland

• • • **Steel producers feel** that a sharp curtailment in steel allotments to machine tool builders is imminent in the first quarter of next year and iron producers are looking each month for reduced allocations to builders. In fact, one producer stated that he was surprised this month that pig iron allocations to machine tool builders held up comparably with last month's supplies.

While the backlogs of orders on builders books are still very large, it is believed that much of this backlog is made up of orders that do not carry very high ratings and much of this production will be curtailed. The steel and iron that would have gone into production of these lesser rated machine tools is vitally needed in arms production and will be diverted to these needs. Essential civilian and low rated arms projects that require machine tools will be put off and will have to operate on what tools as are now on hand.

Tightness in supplies with deliveries projected well into the third quarter of next year are still being experienced on some types of machine tools. Drop hammers, armor plate bending equipment, and various other types of metal working equipment still must carry very high rated orders for even middle and late 1943 delivery. One aircraft builder in the East has tried for months to obtain pneumatic drop hammers, and has been forced into the use of rope hammers for forming aluminum parts.

•

Used Machinery Dealers Must Register under OPA

• • • **Dealers selling used** machine tools, parts and extra attachments this week were receiving OPA certificates of registration. These certificates are the first to go out under OPA's requirement that all dealers in this class must register on form No. SO 20:3. This includes persons acting as principal agents, brokers or auctioneers. Blank forms may be obtained from the machinery branch of OPA, Washington, or through any of the agency's state and regional offices.

•

Chicago Foundrymen Form War Problems Group

Chicago

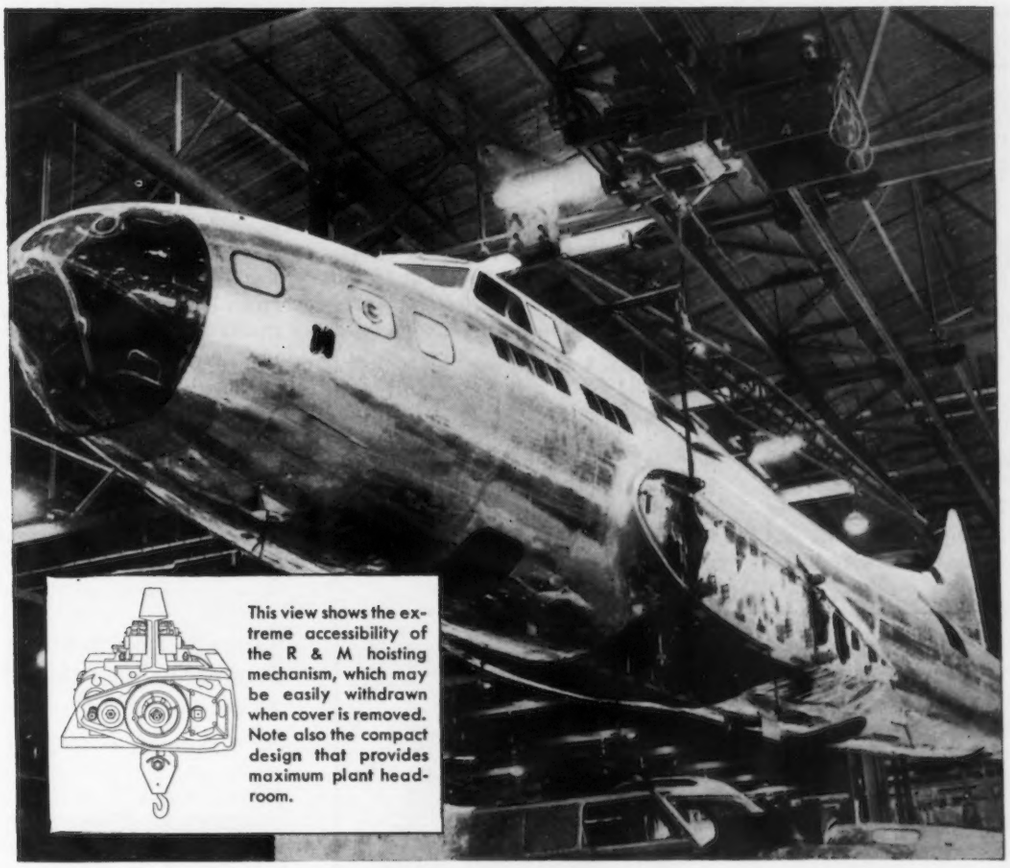
• • • **The Chicago chapter** of the American Foundrymen's Association has formed a War Problems Committee, composed of experts who will assist foundrymen generally on all problems of a technical or general nature relating to production of castings, excluding wage-hour matters and labor relations.

Foundrymen desiring assistance should telephone N. F. Hindle, Randolph 0964. The members of the committee are: E. R. Young, Climax Molybdenum Co., chairman; L. L. Henkel, WPB, vice-chairman; N. F. Hindle, American Foundrymen's Association, secretary; G. H. Curtis, Dodge Chicago Plant, on magnesium; C. K. Faunt, Christensen & Olsen Foundry Co., on brass and bronze; J. H. Gellert, Nichol-Straight Foundry Co., on cast iron; L. H. Hahn, Sivyer Steel Casting Co., on steel; W. D. McMillan, International Harvester Co. on malleable; L. H. Rudesill, Griffen Wheel Co., on cast iron; G. H. Starmann, Apex Smelting Co. on aluminum; H. M. St. John, Crane Co., on brass and bronze; F. S. Sutherland Continental Roll & Steel Foundry Co., on steel; L. J. Wise, Chicago Malleable Casting Co., on malleable.

BOEING

Speeds Work with NUMBER CENSORED R & M Hoists!

They're Saving Time and Labor in Many Departments



This view shows the extreme accessibility of the R & M hoisting mechanism, which may be easily withdrawn when cover is removed. Note also the compact design that provides maximum plant headroom.

There's no time or labor wasted handling Flying Fortress assemblies in Boeing's great plant! A squadron of R & M Hoists, mounted on American MonoRail cranes and tracks, keep 'em moving fast.

Throughout the plant, R & M Hoists are on three-shift schedule. In the hammer shop, foundry, anodic department, engine inspection, and even in the heat-treat room. On every job they are *speeding* production.

Here are just a *few* reasons for their outstanding utility and performance. R & M Hoists are *precision-built* from track to hook; they're powered by famous *R & M motors;* they're *perfectly balanced* to handle loads from any angle. There are hundreds of models in the R & M line, ranging from ½-ton "Davids" to 7½-ton "Goliaths," to fit any application.

Whatever *your* hoisting problem, "take it up" with R & M! Our expert representatives will help you find the solution. Call the nearest R & M sales and service office, or write us at the factory.

R & M HOIST AND CRANE SALES AND SERVICE OFFICES

Albany.....364 Broadway	Cleveland..352 Rockefeller Bldg.	New York.....200 Varick St.
Atlanta.....319 Walton Bldg.	Dallas.....1100 Cadiz St.	Philadelphia.....401 N. Broad St.
Baltimore, Lombard & Concord St.	Denver.....1420 16th St.	Pittsburgh.....H. W. Oliver Bldg.
Boston.....55 Long Wharf	Detroit.....2921 E. Grand Blvd.	San Francisco, 116 New Mtgmry. St.
Buffalo.....2005 Delaware Ave.	Houston..3715 Harrisburg Blvd.	Seattle.....216 Walker Bldg.
Chicago....2400 W. Madison St.	Jacksonville....305 Bisbee Bldg.	Syracuse....204 State Tower Bldg.
Cincinnati.....418 New St.	Newark.....700 Bergen St.	

Montreal....Lyman Tube & Supply Co., Ltd.

ROBBINS & MYERS • INC.

HOIST & CRANE DIVISION, SPRINGFIELD, OHIO • In Canada: Robbins & Myers Co. of Canada, Ltd., Brantford, Ont.

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NON-FERROUS METALS

. . . Market Activities and Price Trends

Third of Idle Copper Refused for War Sale

• • • **Holders of** 32,000 tons of idle and excess copper inventories have refused to sell this metal to the government, it was announced last week by Copper Recovery Corp. "We can't understand why holders of copper would refuse a 'yes' answer when we ask them to sell it for munitions making." E. E. Holman, acting chief of WPB's copper recovery program, said. These hold-outs, nevertheless, represent about a third of the copper reported. In addition 17 per cent of copper holders have not been heard from.

CRC has attempted to avoid requisitioning, because of its cost in time and money, but according to Mr. Holman it is now prepared to adopt a tough policy. So far, out of about fifty cases where requisition was threatened, all but one of the companies have surrendered their stocks at CRC prices. This we-will-requisition process has brought in the recalcitrant copper at a rate of about 1000 tons a week, which CRC feels is too slow.

"No Inventory"

The corporation also received many "no inventory" answers to its questionnaire. To these companies a letter was sent defining in detail "idle and excess inventories." The letter brought in 500 tons, an average of 520 lb. for each of the erstwhile no-inventory holders.

Altogether, CRC has heard from 80,000 business firms which reported 100,000 tons of copper. Of 62,500 tons voluntarily offered for sale, about three-fourths has been allocated to war producers. In addition, about 4000 lb. were reported in primary shapes.

As-is sales, which bring ceiling prices, amounted to 13,400 tons. One trouble as far as the recalcitrant holders is concerned is that most of the 32,000 tons they are holding must be remelted, and they will thus lose the as-is value of their holdings. The government takes about half the loss, having set its remelt prices high.

War plants have been making emergency requests of the corporation at a rate of 250 tons a day. More than half the requests have been filled from idle and excess inventories, sometimes in a matter of hours. Mr. Holman pointed out that sometimes very small inventories, because they happen to be in the right areas, have prevented plant slow downs.

CRC now expects to uncover about 150,000 tons of copper and copper-base alloys altogether, a figure about half the original estimate.

•

Canadian Magnesium Plant Begins Partial Production

Toronto

• • • **Dominion Magnesium** Co.'s plant at Haley's Station is reported rapidly getting into full production. Five retort units are in operation, with three more being heated and two under construction. The whole ten should be in production before the end of the year. The plant has an estimated capacity of 10 tons a day.

•

OPA Makes Price Changes; WPB Starts Warehouse Survey

• • • **Briquetted or baled** aluminum scrap will bring a premium of ½c. per lb., the OPA announced last week.

Buyers of specially prepared brass mill scrap (for instance, brass chips that have been screened and annealed for use in making brake linings) have been given a new procedure for application to OPA for a price. The new procedure is simplified, but it requires ten chunks of information, some of them detailed statements.

Maximum prices for tin oxides

INCREASE PRODUCTION — SAVE TIME AND TOOLS

Use
GRAY-MILLS
"Flo-Bac"
METAL-CUTTING
COOLANTS

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Ask your Distributor.
or write direct

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Highest quality.
4 types cover most all requirements.

Immediately available.
From your distributor's stock or our plant.

Convenient quantities.
3 gal. to 55 gal. — wood or metal containers.

GRAY-MILLS
COMPLETE PORTABLE COOLANT SYSTEMS
FLO-BAC COOLANTS, PANS AND FITTINGS
GRAY-MILLS CO., 233 W. Ontario St., Chicago, Ill.

Lead Restrictions Are Eased at Last

• • • Since last August, when it was realized that about 30 per cent of lead production and imports was going into government stockpiles, the industry has been expecting a loosening of lead restrictions. Last week the long heralded amendment (No. 2 to Order M-38-c) appeared, removing from the restricted list certain flashings, sheet under floorings, pipe, calking lead, shower pans, foil for industrial babbit, certain food packaging, lead sheathed cable, caskets, name plates for industrial machinery and blocks for cutting leather.

One purpose of the order is to encourage the substitution of lead for other more critical materials.

At the same time, Canada has just placed primary lead under direct allocation and put secondary lead under strict control, with the comment, "While lead is not yet in short supply, its use as a substitute for copper, zinc, and other critical metals is on the increase and we must know where it is going."

and anodes purchased by WPB were established as f.o.b. Barber, N. J., instead of point of shipment, as originally issued.

The WPB Compliance Division is conducting a survey of the operators of warehouses which stock brass and wire mill products, to determine whether sales are being made only on A-1-k priorities, or better, as ordered.

•

RFC Reports on $4 Billion Spent for Strategic Metals

• • • The Reconstruction Finance Corp. and its subsidiaries, Metals Reserve Corp. and Defense Plant Corp., have sunk almost four billion dollars in domestic production and acquisition of strategic metals, according to a summary of RFC activities, issued Monday. Since April alone, the three groups have put $1,110,354,900 into buying, producing, processing and stockpiling of metals and minerals.

In addition, MRC has bought 32 different metals in 36 foreign countries, and DPC has invested more than six billion dollars in war activities other than the metals and minerals program.

There are no specific production and capacity figures in the RFC report, but the following comparisons are given:

Bauxite: more than 1941 production plus imports. Aluminum: three times the 1940 output (which was about 206,000 tons). Chrome: five times the previous peak output. Magnesium: 40 to 50 times the 1940 output (which was 6300 tons). Manganese: eight to ten times pre-war production. Tungsten: doubled.

These "figures" apply only to government financed production, and do not include privately financed plants. Most new capacity has been government financed, however.

Some figures on salvaging and inventory buying are 21,000 tons of aluminum bought or requisitioned, of which 15,000 has been allocated; 584 tons of used tin tubes received, yielding 84 tons of tin; 900 tons of white metal and pewter purchased.

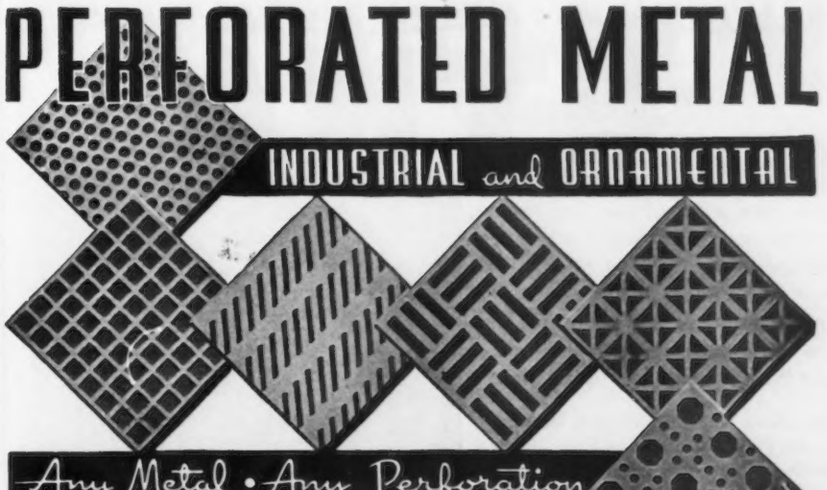
• • • Other non-ferrous news: A concentration plant to utilize North Carolina's deposits of lithium-bearing spodumene, the largest east of the Dakotas, is to be built at King's Mountain, N. C., by the Solvay Process Co. of Syracuse, N. Y. . . . France has levied a special tax on semi-manufactured products of nonferrous metals and alloys, for the benefit of the trade organization committee of commerce for these products. . . . Next year's output of electrolytic tin plate will exceed hot dipped plate by nearly 50 per cent, the American Iron & Steel Institute estimates.

The monthly average prices of the major non-ferrous metals during October were, in reality, the OPA ceiling prices set on those metals. These prices are as follows:

	Cents per lb.
Electrolytic Copper, Connecticut Valley	12.00
Lake Copper, Eastern Delivery	12.00
Straits Tin, Spot, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65
Lead, St. Louis	6.35
Lead, New York	6.50

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



Any Metal • Any Perforation

● The uses of perforated metal are numerous and increasing. Industry requires it for a thousand purposes.

In the preparation of war materials, metals, food, rubber, chemicals, perforated metal is required to perform an important role.

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SCRAP

. . . Market Activities and Quotation Trends

Rejections by Mills Reflect Better Supply

• • • **Indications** that the scrap supply situation is more comfortable, frequently noted in recent weeks as a result of campaigns and the bringing in of more blast furnaces, continued to mount this week.

Temporarily at least, some mills have become more "choosy" and are rejecting material which they were glad to get a few weeks ago. Others are discouraging remote scrap. Particularly ample are the supplies of cast iron and alloy turnings of unknown analysis.

Probably the more comfortable supply situation will slow the movement of volunteered scrap from initial piles to mills, but as long as the material remains in easy reach it constitutes a valuable hedge against possible future emergencies. In New York, public wrath has been mounting over the fact only a small portion of household scrap has been moved from its initial piles. Slashing out at the WPB salvage section, Mayor LaGuardia last week expressed hope the whole section would be abolished. WPB officials pointed out they had not been consulted when the household drive began.

At Philadelphia a flood of scrap allocations came out this week. This seemed to indicate a step toward tighter control over all scrap movements. An unprecedented amount of scrap has been collected at Philadelphia recently. With the limited amount of labor available, yards have done an exceptional job of preparing the material. Shipments to mills have been so rapid that some are said to be considering putting in stop orders as a temporary hedge.

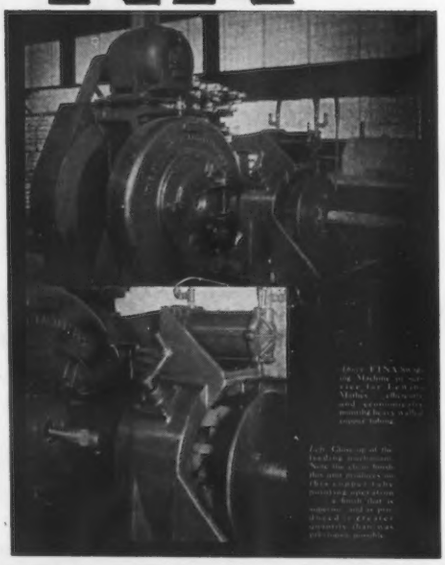
LEWIN-MATHES *Got the right answer at*

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.



IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

ETNA MACHINE COMPANY
TOLEDO OHIO

Salesmen Volunteers Intensify Scrap Drive

Cleveland

• • • **Steel** and warehouse salesmen and executives met here Thursday with John Deibel, regional chief of the Industrial Salvage Section of WPB, and W. L. Selbach, who heads the industrial division of the salvage committee set up by the city's mayor to discuss plans for intensifying the drive for industrial scrap throughout the winter.

Initial calls in the WPB program, in which every salesmen calls on an allotted number of plants four times in a period of 90 days, have been made, but the committee in charge of the drive feels that more pressure must constantly be placed on industrial plants.

•

Salesmen Scrap Hunters To Meet on New Drive

Philadelphia

• • • **The heads of** the local sections of the steel producers' salesmen, steel warehouse salesmen and the steel sales executives who have been conducting the plant-to-plant scrap salvage campaign designed to bring out dormant or unrecognized scrap, met this week to review their accomplishments and to plan a meeting in December to launch their next drive.

S. E. Husted, assistant sales manager of Bethlehem Steel here and vice-chairman of the steel salesmen's group for the area, pointed out that a large amount of scrap had been produced as a result of the joint efforts of the groups working in collaboration with the WPB Salvage Section during the last two months but that this was only the beginning. A meeting is planned for Dec. 4, to start the big push for scrap in the second round.

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Scrap Excluded from Price Adjustment Procedure

• • • **Elimination** of individual sellers of waste, scrap and salvage materials from the scope of an OPA procedural regulation designed specifically for speeding price adjustments under war con-

tracts was announced by OPA last week.

The action, Amendment No. 1 to Supplementary Order No. 9, was effective Nov. 14. It excludes 15 specific price schedules and regulations on scrap materials from the price adjustment procedure provided by Supplementary Order No. 9 and Procedural Regulation No. 6.

In addition to iron and steel scrap, exempted lines include zinc, nickel, brass, copper and lead scrap, as well as rubber, waste paper, silk, rayon and other types of waste.

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ST. LOUIS—Mills are receiving ample scrap for current operations, which in the case of certain companies are at full capacity. In no case have reserves been drawn on and in several instances some additions have been made to inventory during the past two or three weeks. However, apprehensions are still felt for winter supplies, especially by two important mills which are about to complete additional production facilities. A feature of the local situation is an overabundance of cast scrap, which in some instances is cluttering yards, with no outlet here or in adjacent territory.

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NEW YORK—As scrap supplies have increased, so have rejects, according to dealers here who say mills have become more choosy during the past week, particularly over shipments containing household salvage. Several firms here received WPB allocations for shipment to mills in the Valley, which were cancelled by the mills because of freight costs.

Mayor LaGuardia, reporting that 8500 tons of household scrap has been delivered to the mills and that the one scow so far sent to the Bethlehem Steel Co. yards at Elizabethport, N. J., has remained there unloaded for ten days, said, "The city has fulfilled its part in the scrap collection. The people of the city gave scrap and the city government collected it. Delivery to the mills is not a city responsibility." He added that "junk dealers who have metal piled high in their yards cannot possibly sort it and ship it to the mills. The government should take it up and get it to the mills." The Mayor's feud with the WPB Salvage section took a new turn, involving repaving of city streets if the WPB should requisition 15,000 tons of unusued street car rails.

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CHICAGO—The scrap situation is still very spotty here. Yards are shipping sufficient to keep all district furnaces at capacity, but very poor headway is being made to build up winter stocks. In some directions it is still reported that shipments into consumption have shown a small decline recently. Inland Steel Co. on Monday blew in a new blast furnace, its No. 6 furnace. It is expected, however, that one of the company's other furnaces now in blast may have to be taken down soon for rebuilding or relining.

CLEVELAND — Movements into this area are considered fairly good, with mills maintaining a better-than-two-weeks' supply. However, normally at this time of the year the supplies should be stocked sufficiently to maintain four or five month operations. The Valley district supplies are not in such good shape, as those in Cleveland. A maximum of two weeks' supplies are on hand for some of the larger mills, with some of the smaller ones having less than six days' supplies on hand.

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PHILADELPHIA — Dealers here were mystified this week by a sudden flood of scrap allocations to mills in the area from yards which have been serving these mills at a high rate without benefit of allocations. No reason could be found for this action unless scrap, too, is soon to become completely allocated as is pig iron and other commodities. Meanwhile, the shipments equaled or bettered those of last week which topped a five-week rise. All mills claim inventories of from a month to six weeks and some are said to be stopping shipments of certain types of scrap such as turnings to gain a better balance in their inventory.

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BUFFALO—Shortages here have been licked pretty well, according to leading operators, who say plants will not be concerned about the scrap picture for the next 60 or 90 days. Yards continue to lose workers through the draft and the employment situation remains acute.

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CINCINNATI—Dealers generally have a much more optimistic view over the scrap situation than has prevailed for a number of months. Recent drives and now the campaign for industrial scrap, which is getting under way in this district, appeared to have produced such good results that dealers anticipate sufficient material to take care of the need for some time to come.

BIRMINGHAM — Occasioned by the scarcity of presses in the Southeast and by the refusal of mills to buy this material, light sheet scrap collected in this region during the scrap drive is overflowing in dealers' yards and production of heavier grades is being hampered as a result. This condition is particularly noted in areas which carry a freight rate of $4 per ton and higher.

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CHICAGO—Hidden in the astronomical figures for scrap collections was a recent report of a salvage effort by the Rock Island Railroad. Its 25,000 employees collected 5000 tons of scrap on Oct. 31, a day designated by the railroad as "Scrap for Victory Day."

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PITTSBURGH—Little or no change in the easier flow of scrap is noted here. Some plants which had been on the ragged edge are now in a much better position.

WE PUT THE KIDS
TO BED IN 1865!
Atop the roof of the Dunbar spring plant is perched a bell . . . summoning the workers in the morning . . . sending them home at night. This bell also performs a community service . . . for, rung 99 times at nine in the evening, it sends all children home and to bed. The bell still rings . . . the tradition almost forgotten. But the tradition of fine workmanship still goes on in the hands of another generation of springmakers, whose talents are actively engaged in helping to meet the crisis of 1942.
1865
SINCE 1845
1942
Dunbar Bros. Co., Bristol, Connecticut
DIVISION OF ASSOCIATED SPRING CORPORATION

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES (No. 1 Heavy Melting; No. 1 Hydr. Compressed Black Sheets, No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)	Unbaled* Machine Shop Turnings	BLAST FURNACE GRADES (Mixed Borings and Turnings; Shovelling Turnings; No. 2 Busheling; Cast Iron Borings)	No. 2 Busheling	ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
					Low Phos.		Heavy Structural and Plate			Cut Auto Steel Scrap				
					Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under	1 ft. and Under and Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$16.00	$16.00	$17.50	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt.	18.75	14.75	14.75	16.25	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	15.25	15.25	16.75	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	14.25	14.25	15.75	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	14.00	14.00	15.50	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	13.85	13.85	15.35	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo, Ohio	....	13.85	13.85	15.35	....	....	....	....	....	....	....	....	....	....	....
St. Louis, Mo.	17.50	13.50	13.50	15.00	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburgh, Cal.; San Francisco	17.00	13.00	13.00	14.50	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	14.00	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	10.50	10.50	12.00	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.00	12.50	14.00	15.50

*Baled turnings are $4 per gross ton higher. Dealers may charge $2 per ton for crushing other than heavy turnings. An industrial producer may charge $1.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, cut auto scrap and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.65 per ton.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $2.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of $2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$19.00	$19.00	$20.00
No. 1 machinery cast, drop broken, 150 lbs. and under	18.00	19.00	20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	17.50	18.50	19.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switch district of Kansas City, Kan., Mo.

. . . Composite Prices

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. (Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Nov. 17, 1942	Nov. 10, 1942	Oct. 20, 1942	Nov. 18, 1941
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

(Per Gross Ton)	Nov. 17, 1942	Nov. 10, 1942	Oct. 20, 1942	Nov. 18, 1941
No. 2 fdy., Philadelphia	$25.89	$25.89	$25.89	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh	20.00	20.00	20.00	22.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	24.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.00	$6.00	$6.00	$6.125
Foundry coke, prompt	6.875	6.875	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 143 to 150 herein.

. . . Comparison of Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 17, 1942	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1942	2.30467c.,	2.30467c.,	$23.61	$23.61	$19.17	$19.17
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	$4.50		$4.50												
Black plate, 20 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.39¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢[13]	2.27¢	2.40¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢[13]	2.27¢		2.49¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70c)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70c				2.70¢	Bethlehem, Massillon, Canton = 2.70c)						2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
								(Coatesville and Claymont = 2.10¢)							
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢[11]		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright[15]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70c)					3.10¢			2.94¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [11] Ship plates only. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

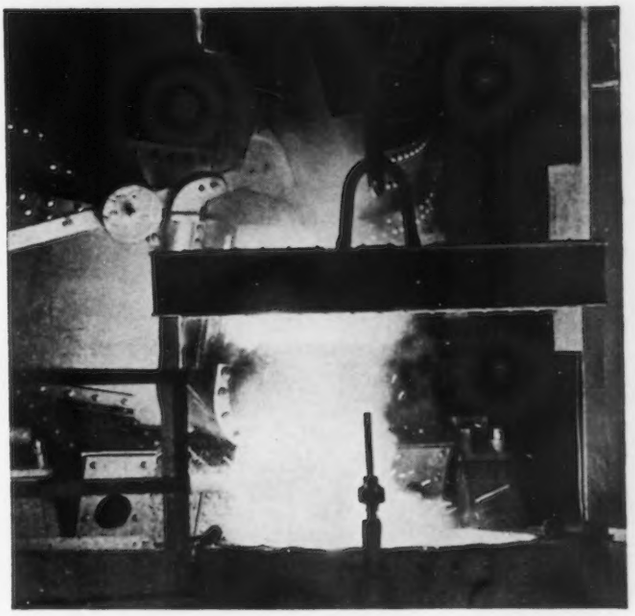
EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.33c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

To replace strategic materials in cold-forming operations

Consider DISSTON PLASTIRON

A high quality low-carbon electric furnace steel soft enough to be cold-fashioned into many types of intricate shapes.



If the severe restrictions on strategic soft metals and non-ferrous alloys have affected your operations, it will pay you to investigate Disston Plastiron.

Plastiron is produced by tool steel practice in electric furnaces, from carefully selected materials. It is a fine Disston Steel of very low carbon content—extraordinarily sound, clean and uniform. Special inspection for segregation and porosity insure freedom from pin point pits.

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GET YOUR SCRAP IN THE SCRAP!

SEMI-FINISHED STEEL

For exceptions, see preceding page

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.25 higher; f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00
Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	$54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.25 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 420	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8020	.18/ .23	1.00/1.30	.040	.040	.20/ .35			.10/ .20	.45	9.00	.95c	$19.00
NE 8022	.20/ .25	1.00/1.30	.040	.040	.20/ .35			.10/ .20	.45	9.00	.95	19.00
NE 8339	.37/ .42	1.30/1.60	.040	.040	.20/ .35			.20/ .30	.75	15.00	1.25	25.00
NE 8442*	.40/ .45	1.30/1.60	.040	.040	.20/ .35			.30/ .40	.90	18.00	1.40	28.00
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.15/ .25	.75	15.00	1.25	25.00
NE 8715	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8722	.20/ .25	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8735	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8739	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8740	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8744	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8749	.45/ .50	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .60	.20/ .30	.80	16.00	1.30	26.00
NE 8949*	.45/ .50	1.00/1.30	.040	.040	.20/ .35	.40/ .60	.40/ .60	.30/ .40	1.20	24.00	1.70	34.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/ .65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.20/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30c	$26.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30	26.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30	26.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30	26.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30	26.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30	26.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.80	16.00	1.30	26.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.85	17.00	1.35	27.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.85	17.00	1.35	27.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.20/ .40	.20/ .40	.08/ .15	.85	17.00	1.35	27.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .60	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .60	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .60	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1 50	.040	.040	.40/ .60	.40/ .60	.40/ .60	.15/ 25	1.20	24.00	1.70	34.00
NE 9630	.28/ .33	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9635	.33/ .38	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9637	35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9640	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9642	.40/ .45	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9645	.43/ .48	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9650	.48/ .53	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00

***Recommended for large sections only.**

Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

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BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	**U.S.S.**	**S.A.E.**
7/16 in. and smaller		64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets (½ *in. and larger*)

Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets (7/16 *in. and smaller*)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 5

Cap and Set Screws

Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	***$25.53***	***$25.03***	***$26.53***	***$26.03***	.....	.....
Brooklyn	***27.65***	.....	.....	***28.15***	.....	.....
Jersey City	***26.62***	***26.12***	***27.62***	***27.12***	.....	.....
Philadelphia	***25.89***	***25.39***	***26.89***	***26.39***	.....	.....
Bethlehem, Pa.	**$25.00**	**$24.50**	**$26.00**	**$25.50**	.....	.....
Everett, Mass.††	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....
Swedeland, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....
Steelton, Pa.	.....	**24.50**	.....	.....	**$29.50**	.....
Birdsboro, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	**29.50**	.....
Sparrows Point, Md.	**25.00**	**24.50**	.....	.....	.....	.....
Erie, Pa.	**24.00**	**23.50**	**25.00**	**24.50**	.....	.....
Neville Island, Pa.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Sharpsville, Pa.*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Buffalo	**24.00**	**23.00**	**25.00**	**24.50**	**29.50**	.....
Cincinnati	***24.68***	***24.68***	.....	***25.18***	.....	.....
Canton, Ohio	***25.47***	***24.97***	***25.97***	***25.47***	.....	.....
Mansfield, Ohio	***26.06***	***25.56***	***26.56***	***26.06***	.....	.....
St. Louis	***24.50***	***24.00***	.....	.....	.....	.....
Chicago	**24.00**	**23.50**	**24.50**	**24.00**	.....	***$31.34***
Granite City, Ill.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Cleveland	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Hamilton, Ohio	**24.00**	**23.50**	.....	**24.00**	.....	.....
Toledo	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Youngstown*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Detroit	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	**$28.00**
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	**33.00**
St. Paul	***26.76***	.....	***27.26***	***26.76***	.....	.....
Duluth	**24.50**	.....	**25.00**	**24.50**	.....	.....
Birmingham	**20.38**	**19.00**	**25.00**	.....	.....	.....
Los Angeles	***27.25***	.....	.....	.....	.....	.....
San Francisco	***27.25***	.....	.....	.....	.....	.....
Seattle	***27.25***	.....	.....	.....	.....	.....
Provo, Utah	**22.00**	.....	.....	.....	.....	.....
Montreal	***27.50***	***27.50***	.....	***28.00***	.....	.....
Toronto	***25.50***	***25.50***	.....	***26.00***	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

CITIES	SHEETS			STRIP		Plates (¼ in. and heavier)	Structural Shapes	BARS			ALLOY BARS		
	Hot Rolled (10 ga.)	Cold Rolled	Galv. (24 ga.)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled 2300	Hot Rolled 3100	Cold Drawn 2300	†Cold Drawn 3100
Pittsburgh	$3.35	....	$4.65	$3.60	$3.20	$3.40	$3.40	$3.35	$3.65	$7.45	$5.75	$8.40	$6.75
Chicago	3.25	$4.10	4.85[1]	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland	3.35	4.05	4.62	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Philadelphia	3.55	4.05[5]	4.65	3.51	3.31	3.55	3.55	3.85	4.06	7.31	5.86	8.56	7.18
New York	3.58	4.60[2]	5.00	3.96[6]	3.51	3.76	3.75	3.84	4.09	7.60	5.90	8.84	7.19
Detroit	3.43	4.30	4.84[1]	3.68*	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.05
Buffalo	3.25	4.30[1]	4.75[4]	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Boston	3.71	4.68	5.11	4.06	3.46	3.85	3.85	3.98	4.13	7.75	6.05	8.88	7.23
Birmingham	3.45[3]	....	4.75[1]	3.70[3]	....	3.55[3]	3.55[3]	3.50[3]	4.48	....	....	....	....
St. Louis	3.39	4.24[2]	4.99[1]	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee	3.38	4.23[2]	4.98[1]	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.98
Baltimore	3.50	....	5.05	4.00	....	3.70	3.70	3.85	4.04	....	....	....	....
Cincinnati	3.42	4.37[2]	4.42[1]	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Norfolk	3.85	....	5.40	4.10	....	4.05	4.05	4.00	4.15	....	....	....	....
Washington	3.60	....	....	4.10	....	3.80	3.80	3.95	4.10	....	....	....	....
Indianapolis	3.45	4.25	5.01[1]	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.07
Omaha	3.85	....	5.52[1]	4.20	....	4.15	4.15	4.10	4.42	....	....	....	....
Memphis	3.85	....	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	4.05	....	....	4.30	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	4.00	....	....	4.30	....	4.05	4.05	3.75	....	....	....	....	....
Los Angeles†	4.95	7.15	5.95	4.90	....	4.90	4.60	4.35	6.60	9.55	8.55	10.55	9.55
San Francisco†	4.55	7.05	6.10	4.50	....	4.65	4.35	3.95	6.80	9.80	8.80	10.80	9.80
Seattle†	4.65[7]	....	5.70[7]	4.25	....	4.75	4.45	4.20	5.75	....	8.00	....	....

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. At Philadelphia galvanized sheets, 25 or more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb., galvanized and cold rolled sheets, 750 to 4999 lb., cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations. * 12 gage and heavier, $3.43. † Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.